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ABSTRACT

This volume of "Abstracts of Research Papers 1972" is comprised of abstracts, precisely as submitted by the authors, of the 128 papers scheduled for presentation at the 1972 Houston convention of the American Association for Health, Physical Education and Recreation. Although an attempt was made to group papers by subject content, this was not always possible. The name and address of each author, to whom inquiries for further information may be sent, appear after each abstract. An index of all authors appears in the end of the volume. (Author/WS)

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ABSTRACTS

Research Papers 1972 AAHPER Convention

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ABSTRACTS

of Research Papers 1972

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the American Association for Health
Physical Education and Recreation

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PREFACE

This volume of Abstracts of Research Papers 1972 includes abstracts, precisely as submitted by the authors, of the 128 papers scheduled for presentation at the 1972 Houston convention. Although an attempt was made to group papers by subject content, this was not always possible. Factors which interfered with such scheduling efforts included time limits imposed for individual sessions in relation to the number of papers dealing with a given subject as well as the necessity of avoiding conflicts with other commitments for those reporting studies.

The number at the bottom of the page in this collection of abstracts represents the number assigned to the study and is identical to the number appearing in the convention program. The time and date each paper will be presented are indicated in the lower left-hand corner of each page. The name and address of the author to whom inquiries for further information may be sent appear in the lower right-hand corner. An index of all authors is presented at the conclusion of this volume.

G. Alan Stull
Abstracts Editor
University of Maryland
College Park, Maryland

ACKNOWLEDGMENTS

The Program Chairman of the Research Section was extremely fortunate that many individuals gave unselfishly of their professional talents in the planning and conduct of the 1972 meetings. Considerable time and effort were expended in both the reviewing of studies submitted for presentation and the actual scheduling of papers. The willingness of a number of AAHPER members to preside at the meetings is also acknowledged. Special appreciation is extended to John J. Burt, B. Robert Carlson, William C. Chasey, David H. Clarke, Harold B. Falls, Jr., Katharine Fox, B. Don Franks, Trent E. Gabert, Barbara J. Hoepner, David L. Kelley, William D. McArdle, Chauncey A. Morehouse, John P. Raducha, D. Laine Santa Maria, Richard A. Schmidt, Robert N. Singer, Wayne E. Sinning, William R. Spieth, Robert W. Tyler, Wynn F. Updyke, Lee VanderVelden, J. Grove Wolf, and M. Nadine Zimmerman.

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THE INDEX OF PREPROGRAMMING (IP): A STATISTICAL METHOD FOR EVALUATING THE ROLE OF FEEDBACK IN SIMPLE MOVEMENTS.

Richard A. Schmidt, The University of Michigan.

A preprogrammed response is defined as one for which all of the decisions about the motor commands are determined in advance, with the movement being carried out without feedback control. The Index of Preprogramming (IP) is proposed as a measure of the extent to which the movement is preprogrammed. In a situation involving "receptor anticipation," the subject watches a .01-sec. timer rotate through 2.0 sec. He begins with his hand in a starting position and moves his hand to a finish position so that his arrival there is coincident with one clock reaching 2.0 sec. Three measures are defined: starting time (ST) is the time from the subject's first movement until the clock reaches 2.0 sec.; movement time (MT) is the time from the subject's first movement until he reaches the finish position, and algebraic error (AE) is the difference (with respect to sign) between the clock's arrival at 2.0 sec. and the subject's arrival at the finish point. Thus, AE = ST-MT. The IP is the within-subject correlation between AE and ST, with N being the number of trials over which the correlation is computed. On logical grounds, the IP should be sensitive to the degree of preprogramming, and evidence indicated that the IP is sensitive to variables which should manipulate the degree of preprogramming in the movement: movement speed, movement distance, and load on the movement. Possible limitations of the IP as well as the potential applications to research on motor skills are discussed.

Richard A. Schmidt
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March 24, 1972
10:45 a.m.

SKILL LEVEL AND ADAPTATION TO A REARRANGED VISUAL ENVIRONMENT.[1]

William R. Spieth, Georgia Southern College.

The main purpose of this study was to investigate whether a group of college males possessing a high level of motor skill adapted to a rearranged visual environment to a greater extent than did a group of college males possessing a low level of motor skill. Two groups of 30 subjects each were selected from a total of 775 students on the basis of previous experiences in various types of sports and games during specified developmental stages of growth and on the basis of a battery of four motor ability tests dependent to a great degree on eye-hand coordination. The subjects attended six experimental sessions to determine their ability to adapt to the rearranged visual environment. The measurements determining the amount of adaptation to rearrangement were calculated from scores obtained on a mirror-box for each subject before and after his performance on two specific types of motor skill tasks under two specific movement conditions while he wore 24 diopter prism lenses. Coefficients of correlation and analysis of variance were used to compare the two groups on (1) their amount of adaptation to rearrangement, (2) the amount of adaptation dependent upon the type of movement condition and, (3) the amount of adaptation dependent upon the type of motor task. The results indicated there were no significant differences between the groups on any of these conditions. These findings warranted the rejection of the hypothesis that the amount of adaptation to a rearranged visual environment is dependent upon previous early experiences in various sports and games and upon the level of skill.

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[1]This study was supported in part by a research grant from Georgia Southern College, Statesboro, Georgia.

William R. Spieth
Georgia Southern College
Statesboro, Georgia

March 24, 1972
11:00 a.m.

THE EFFECTS OF SELECTED VISUAL CONDITIONS ON THROWING ACCURACY.

Dr. Robert A. Cobb, University of Maine at Orono.

It was the purpose of this study to compare the effects of selected visual conditions on the performance of throwing for accuracy. There were three distinct, yet related, throwing activities consisting of (1) throwing a conventional dart at a stationary target, (2) throwing a baseball at a stationary target, and (3) throwing a football at a stationary target. Th visual conditions to which the subjects were exposed were (1)the total field of vision available to the performer, (2) only the peripheral field of vision available to the performer, (3) only the central field of vision available to the performer, and (4) complete visual occlusion. With peripheral and central vision, two different-sized fields were included for each. From the evidence provided by this study, in general, it appears that the greater the size of the visual field available to the performer, providing that he can see the target itself, the higher is the level of accuracy. The level of accuracy diminishes when the target itself cannot be seen, and continues to diminish further when the area surrounding the target is occluded leaving only the peripheral visual field falling beyond twenty degrees from the center of the target Throwing with no visual fields whatsoever available to the performer has an obviously deteriorating effect upon throwing accuracy. It appears that when the performer has at least some visual sensory input, he can achieve significantly higher levels of accuracy than when he has none. Total vision has no distinct advantage over central vision in relation to throwing accuracy.

Dr. Robert A. Cobb
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March 24, 1972

11:15 a.m.

EFFECTS OF SPECIFICITY OF INFORMATION FEEDBACK ON LEARNING A MOTOR SKILL.* Frank L. Smoll, University of Washington.

The purpose of the study was to determine the effects of specificity of information feedback (IF) upon the learning of a gross motor skill. Forty-five Ss were randomly assigned to three groups of 15 each. Following an initial warm-up and determination of the S's maximum duckpin bowling ball velocity, each S endeavored to learn to deliver a duckpin bowling ball at a specified velocity equal to 70% of his maximum velocity. Specially designed electronic equipment was utilized to obtain the velocity of a delivered ball (expressed as time for a distance of 60 feet); the velocity objective was given in seconds and hundreths-of-a-second. Each S performed 60 trials under conditions of repetitive trial presentation (intertrial interval= 50 seconds), and the E verbally presented IF immediately after each delivery. Ss in Group I received quantitative IF accurate to hundreths-of-a-second; Ss in Group II received quantitative IF accurate to tenths-of-a-second; and Ss in Group III received descriptive IF (IF expressed in qualitative terms in relation to the specified velocity -- i.e., too slow, too fast, or correct). ANOVA tests were used to determine significance of between-group differences in the levels of performance achieved ($p < .05$); also, trend analysis was employed as a means of testing for systematic variation in the performance of Ss who performed under the same experimental conditions as well as a means of examining and comparing performance curves of the groups exposed to different learning conditions. On the basis of the findings with regard to the learning of a gross motor skill, it was concluded that practice involving more specific IF (quantitative IF) results in a significantly higher level of performance than practice involving less specific IF (descriptive IF). There is an optimum specificity of IF in terms of what is meaningful to performers and what the human mechanism is capable of utilizing. Practice involving IF that is more precise than an optimum specificity does not improve learning.

*This study was completed as part of a doctoral dissertation at the University of Wisconsin, under the supervision of Muriel R. Sloan.

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March 24, 1972

11:30 a.m.

THE EFFECT OF PRE-TASK SPEED TRAINING ON SKILL ACQUISITION USING THE PURSUIT ROTOR. Barbara E. Jensen, Springfield College.

Research on the effect of pre-task speed training on pursuit rotor scores has used a single pre-task training speed which was either under or over that of the criterion task. The study completed utilized an increasing pre-task speed training program. The purpose of the study was to determine the effect of four pre-task speed training programs on pursuit rotor scores for 47 college women physical education majors from Springfield College during the spring of 1971. Pre-task speed training was defined as practice sessions on days 1-3 utilizing four speed training groups with settings on the pursuit rotor of 20-20-40 RPM, 30-30-45 RPM, 30-40-50 RPM, and 60-60-60 RPM. The test task involved performance at a speed of 60 RPM over three additional days. The Layfayette Photo-electric Pursuit Rotor (30014) with a triangular top plate was used. On each of the six days the S's performed 15 twenty second trials.

The analysis of data included a 4x3x10 (speed training x days x trials) factorial analysis of variance with repeated measures on days (days 4-6) and trials (trials 6-15). The F ratio for the speed groups was .5623, which indicated a non-significant difference among the means from the pre-task training groups for days 4-6. The Days F ratio was 9.0378, indicating a significant difference at the .01 level for the day 4-6 means. The Duncan Multiple Range test analysis showed that mean scores from day 4 were significantly lower that days 5 and 6. An ANOVA for day 4 indicated no significant difference in mean performance for the four speed training groups at that point. F ratios for the trials and interaction components were all non-significant.

Previous studies indicated that training at the criterion speed was beneficial when speed was involved in the final test task. These results applied to initial differences and they tended to level off with practice. The results of this investigation indicated no significant differences, even for day 4, when four progressive speed training programs were used. Although the literature appears to indicate that this area of research has been resolved, the investigation presented here contradicts the previous findings. Further research might consider the effect of difficulty of task and/or the ability to monitor perceptual cues in relation to speed training.

This study was supported in part by the Springfield College Research Fund.

Dr. Barbara E. Jensen
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March 24, 1972

11:45 a.m.

VENEREAL DISEASE INSTRUCTION: A COMPARISON OF METHODS. Jean Heindel, Hanover Junior High, Hanover, Pa.; Herb Jones, Helping Teacher, Health Education, Prince George's County, Maryland.

The study compared the relative effectiveness of conventional instruction and programed learning in venereal disease education utilizing the responses of 393 eighth grade students and 480 tenth grade students from six Prince George's County, Md. secondary schools. Subjects (in intact groups) were randomly divided into three groups: conventional, programed, and control. The treatments were assigned randomly to the groups. Teachers of the respective schools directed the three day venereal disease education program for the conventional group; student manuals, Facts About Syphilis and Gonorrhea by Wm. F. Schwartz were utilized by the programed group; and the control group received no formal instruction. A Teaching Test on Syphilis and Gonorrhea was administered to all three groups prior to the venereal disease education program, immediately following the program, and again approximately four weeks later. All data were treated statistically at the .05 probability level using Dayton's two dimensional repeated measures analysis of variance with repetition on one dimension (tests). Where significant F-ratios were found, Tukey's w-procedure was applied. No significant differences in the effectiveness of the two methods were demonstrated at either the post-test or retention levels. Both experimental groups demonstrated significantly higher scores than the control group at both post-test and retention levels. Eighth and tenth grade students are poorly informed about the major venereal diseases. Students at both grade levels can learn about venereal diseases and seem to retain the information well. Programed materials are best utilized with higher grade level students.

Herb Jones, Health Education
Prince George's County Schools
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March 24, 1972
10:45 a.m.

RESULTS OF A DRUG EDUCATION COURSE ON TEACHERS' ATTITUDES. Thomas J. Gleaton, Jr., and Sidney P. Smith, Georgia State University.

The growth of drug-orientated culture in the United States became increasingly evident during the 1960's, and the use of mind-altering substances has reached crisis proportions in our society. To combat this phenomenon federal, state, and local agencies have reacted by providing monies, personnel, and guidelines for educational program development. This study was designed to determine: (1) the attitudinal changes of teachers enrolled in drug education courses with respect to five concept variables: (a) Drugs in My Life, (b) Learning About Drugs, (c) Drug Addict, (d) Medical Treatment for Drug Abusers, and (e) Legal Treatment for Drug Abusers, and (2) attitudinal changes with "Drug Education" as a referent in attitude toward any subject evaluation. An evaluative instrument, based on Osgood, Semantic Differential, was used to measure attitudinal changes among teachers. The sample consisted of 100 teachers from metropolitan areas in Georgia. A correlated t-test was used for statistical treatment of pre- and post-scores for each scale. Significant differences, following drug education course, were found in teachers attitude toward "Drugs in My Life" (pleasant & good), "Learning About Drugs" (nice), and "Drug Education" (positive). No significant differences were found in teachers attitude toward "Legal Treatment for Drug Abusers", "Medical Treatment for Drug Abusers", or "Drug Addict". It seems that the more personal variables "Drugs in My Life" and "Learning About Drugs" were viewed by this sample of teachers as being more relevant to them than the non-personal variables "Drug Addict" and "Legal and Medical Treatment for Drug Abusers".

Thomas J. Gleaton, Jr.
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March 24, 1972

11:00 a.m.

A STUDY OF THE READABILITY OF DRUG EDUCATION MATERIAL IN GRADES FIVE THROUGH TWELVE. Emma Morris, Texas Woman's University. (Don J. Merki)

One hundred drug education pamphlets were examined and the predicted level of readability assessed by means of the Dale-Chall Formula for readability. The analysis of data adhered to the following procedures: (1) grouping of data by grade level in order to reveal percentages at each level and to determine the range and mean grade level of the total data; (2) grouping of data by source, in order to reveal the range and mean grade levels of the materials from each source of publication; (3) grouping of proportionate data in order to determine the relationship of the proportionate distribution of data. The pamphlets tested revealed a high percentage of technical and repetitive materials. The investigation further indicated that much of the material was not within the readability levels of the proposed drug education program grades in Texas. Implications are that school districts will be limited greatly in their selection of supplementary materials, as almost half of the pamphlets were assessed above the twelfth grade level. Attention is drawn to the need for pamphlets written at the elementary and lower secondary level. Among the recommendations made relative to the findings was that the range of these materials should extend from kindergarten through grade twelve and be written at the appropriate level of these students.

Emma Richardson Morris, Ph. D
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March 24, 1972
11:15 a.m.

A STUDY OF THE RELATIONSHIP BETWEEN HEALTH KNOWLEDGE, SELF-ACTUALIZATION AND CLASSROOM VERBAL BEHAVIOR OF SECONDARY SCHOOL HEALTH STUDENT TEACHERS. Robert N. Collins, University of Oregon.

This study identified relationships between health knowledge, self-actualization and classroom verbal behavior of 40 health student teachers from the University of Oregon during the Fall, Winter and Spring terms 1969-1970. Three instruments were used: Shaw Health Knowledge Test, Shostrom's Personal Orientation Inventory and Flanders Interaction Analysis system. The Shaw Health Knowledge Test and Personal Orientation Inventory were administered each term to the student teachers. Flanders Interaction Analysis system was used each term to analyze their classroom verbal behavior. During each ten weeks of student teaching three 20 minute observations were taped for each student teacher. Their total classroom verbal behavior was then grouped by percentage into four categories: 1) indirect influence, 2) direct influence, 3) student talk, 4) silence or confusion. These data were analyzed and statistically treated utilizing Efroymson's multiple regression analysis technique. Findings are presented for each of the five hypotheses. Four recommendations were made: 1) to compare health student teachers from various universities on the Shaw Health Knowledge Test, Personal Orientation Inventory and their classroom verbal behavior; 2) to compare health student teachers with their supervising teachers on these same instruments; 3) to study the differences in verbal behavior between two groups of student teachers, one of which receives instruction in the interaction analysis system of classroom observation; and 4) to encourage institutions preparing health educators to utilize Flanders Interaction Analysis or some other system of interaction analysis with their student teaching program to gain a more objective view of student teachers' classroom verbal behavior and provide them with a means for self-analysis.

Robert N. Collins
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March 24, 1972
11:30 a.m.

SELECTED CONSUMER HEALTH PRACTICES AND OPINIONS OF OLDER ADULTS IN WHATCOM COUNTY, WASHINGTON. Evelyn E. Ames, Western Washington State College.

This study distinguished active older adults from passive older adults and investigated their consumer health practices and opinions. Place of residence, age, and prior education were additional variables. Ninety-five older adults, noninstitutionalized, at least 65 years of age and living in Whatcom County, Washington were interviewed by means of a revision of an instrument used in a United States Government study. Data, analyzed by means of percentages and chi-square, showed that the use of dietary supplements other than vitamins was the exception rather than the rule. The active-passive status of older adults was not an influencing factor in health practices nor in the type of health service personnel utilized. It was an influencing factor in the opinions they had about health products and information. Active older adults' opinions were more definite and appeared to be more accurate. Age was an influencing factor in regard to practices and opinions. Subjects aged 80+, although reporting a higher incidence of arthritic conditions and hearing impairments, stated they hardly ever worried about their health. Place of residence and prior education were influencing factors in an older adult's assessment of his health. Urban subjects did not worry as much as rural about their health. Subjects who had at least one year of college were more likely to worry about their health and also think that they worried more about their health than others their age. It was apparent that the elderly had several misconceptions about consumer health practices, products, and information.

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March 24, 1972
11:45 a.m.

PLASMA CHOLESTEROL CONCENTRATIONS AS EFFECTED BY EXERCISE, TEMPERATURE AND HUMIDITY

Wayne H. Osness
University of Kansas

This study was designed to determine the effects of varied ambient temperatures, relative humidities and exercise levels on the concentration of cholesterol in plasma. Temperatures ranging from 38° F. to 100° F.; relative humidities ranging from 19 to 100 per cent; and work loads ranging from rest to 1200 kilopond-meters were used in the study. Each of the three young healthy male subjects were tested during the same 100 different test conditions involving all combinations of five exercise levels, five ambient temperatures and four relative humidities. Each test was preceded by a twelve hour fast and standardized dietary intake two hours prior to the testing. A resting blood sample was taken 30 minutes before the test was started. A 20 minute acclimatization period at the prescribed conditions preceded an eight minute test situation at rest or steady state exercise. During the seventh minute of work and while the subject was working, a 20 ml sample of blood was drawn from the anticubital vein. It was quickly cooled and spun down to remove the plasma. The plasma was immediately frozen and stored until analysis was completed using a common set of standards and regents. Concentration data for cholesterol and eleven other metabolites was obtained for each of the three hundred test situations. Mean values and standard deviations were computed for each gradation of the three conditions and an analysis of variance was run to determine significant differences between them. Correlations were also computed between cholesterol and the eleven other parameters. The results of the study indicated that (1) extreme temperatures elicited an increase in cholesterol concentrations; (2) all four exercise levels elevated the cholesterol concentration to approximately the same degree and (3) little difference was noted in cholesterol concentration with humidity variation.

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March 24, 1972
2:00 p.m.

EFFECT OF MAXIMAL AEROBIC EXERCISE ON PLASMA RENIN LEVELS AND CATECHOLAMINE EXCRETION IN COLLEGE MALES. Donald A. Olewine, Frank H. Ramsey, Georgia Southern College; Michael T. Simpson, Rudolf Meire, Curtis G. Hames, Hames Clinic, Claxton, Georgia; Laurence S. Jacobs, M.D., Communicable Disease Center, Atlanta, Georgia.

The purpose of the study was to determine plasma renin levels and catecholamine excretion following maximal aerobic exercise in fifteen college male students. Catecholamine excretion was determined by bioassay using rabbit aortic strips and expressed in equivalents of norepinepherine. Plasma renin values were determined by bioassay in nephrectomized rats. Each subject was given at least one preliminary treadmill test and all were asked to conform to the following: (1) No medication of any kind during the 7 days preceding the test, (2) No strenuous exercise during the afternoon and evening prior to a test, (3) No breakfast or coffee until completion of a test. All tests were conducted between 6:30-10:30 A.M. Following 30 minutes of quiet rest in a horizontal position, a resting venous blood sample was obtained. Following this, a timed resting urine sample was collected. The subject then walked on the treadmill using the Balke procedure with the workload increasing 1 Met every two minutes until the heart rate reached 180 beats/min. Immediately following exercise the subject returned to a reclining position and the exercise peak blood sample obtained. Fifteen minutes later a recovery blood sample was taken. This was followed by the collection of the exercise urine sample. A recovery urine sample was obtained 60-120 minutes later. The mean resting heart rate was 60.7 $\pm$ 2.4 beats/min. At a mean workload of 9.4 $\pm$ 0.3 Mets, the heart rate of 180 beats/min. was reached. This resulted in a significant increase in both the plasma renin and in catecholamine excretion (renin: rest 148.0 $\pm$ 56.3 v.s. exercise 266.7 $\pm$ 36.2 nangm/100 ml; catecholamine: rest -5.60 ugm/hr. v.s. exercise -10.53 $\pm$ 0.95 ugm/hr.). Recovery values for the above were within range of resting levels. The total group could be subdivided into relatively fit and relatively unfit groups by the workload required to achieve a heart rate of 180 beats/min., (Relatively Fit = 10.2 $\pm$ 0.2 Mets, N=8, Relatively Unfit = 8.6 $\pm$ 0.2 Mets, N=7). Each of these groups showed a significant increase in both plasma renin and catecholamine excretion. There were no significant differences in these values between the two sub-groups.

Frank H. Ramsey, Ph.D.
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March 24, 1972

2:15 p.m.

EFFECT OF A FOUR-MONTH PHYSICAL FITNESS PROGRAM ON SERUM TOTAL GLUCOCORTICOID LEVELS IN ADULT MALES. John A. White & A. H. Ismail, Purdue University.

The purpose of the study was to determine the effect of a four-month physical fitness program on the serum total glucocorticoid levels in adult males. The subjects used in this study were 22 adults, aged 26 to 56 years, selected from participants in the Purdue Adult Fitness Program held in the Spring of 1971. Two groups were established, one active (n=11) and one sedentary (n=11), according to the fitness criterion of Ismail et al. All subjects were tested on a bicycle ergometer before and after the program, and venous blood samples were collected at four metabolic stages: at rest, submaximal exercise, maximal exercise, and at recovery. Total glucocorticoid levels (cortisol plus corticosterone) were determined using a modification of the method of B. E. Murphy utilizing a competitive protein-binding technique. Analysis of variance was used to examine differences between groups during the four stages of metabolic activity before and after the program. Significant differences between the active and sedentary groups were noted before the program at submaximal and maximal exercise, and at recovery. The active group have significantly lower glucocorticoid levels at the different stages. Differences between initial and final means for the sedentary group were noted at submaximal and maximal exercise with lower glucocorticoid levels observed after the program. As to the active group means, no significant differences were observed between the initial and final scores. The data provide evidence that participation in a well-organized physical fitness program tends to reduce serum glucocorticoid levels during exercise in the adult sedentary male group. Furthermore, active and sedentary groups can be characterized by their pattern of glucocorticoid activity during exercise stress.

John A. White
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March 24, 1972
2:30 p.m.

THE EFFECT OF AN EIGHT-MONTH PHYSICAL FITNESS PROGRAM ON SERUM URIC ACID CONCENTRATION. D. L. Montgomery, A. H. Ismail, and D. L. Corrigan, Purdue University.

The purpose of the study was to determine the effect of acute and chronic exercise on serum uric acid concentration (SUAC). Three groups of men ranging in age between 23 and 62 years, who were classified as high (n=8), medium (n=8), and low fit (n=8) groups, were tested at four stages of metabolic stress, namely rest, submaximal, maximal and recovery. The subjects were tested three times: at the beginning, middle, and at the end of an eight-month physical fitness program. The SUAC was determined using the SMA 12/60 method which is based on the reduction of a phosophotungstate complex to a phosphotungstite complex. Analysis of variance technique was used to determine significant changes, if any, among the three groups on both the acute and chronic exercise effects. The results indicated that: 1) During the initial testing it was found that acute physical exercise increased the SUAC from the resting to the submaximal exercise, maximum exercise, and continued to increase during the recovery period. 2) At the conclusion of the eight-month period, increases in SUAC were found at the four metabolic states. 3) The high-fit group had significantly lower SUAC than did the low-fit group at each of the four metabolic states; however, no significant difference in SUAC was observed between high and medium fitness groups. 4) Of the physiological variables involved, physical fitness score, per cent lean body weight, and diastolic blood pressure correlated the highest with SUAC. It was concluded that both acute and chronic physical exercise increase the SUAC for all three fitness levels.

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March 24, 1972
2:45 p.m.

THE EFFECTS OF EXERCISE TRAINING ON SERUM LEVELS OF THYROXINE.
Wallace W. Hutchison, Iowa State University.

The purpose of this study was to investigate the effects, if any, of a daily systematic physical conditioning program upon blood serum thyroxine (T-4, T-3, T-7, and PBI) levels. In addition, the effects of exercise on basal metabolic rate of human subjects were determined and a twenty-four hour thyroxine (T-4 and T-3) blood serum level was measured at three-hour intervals. Eighteen volunteer male subjects, ranging in age from 22 to 33 years, were used in this study. Blood samples were drawn from each of the eighteen subjects at the onset of the testing period, at post two weeks, at post four weeks, and at the conclusion of the six-week daily systematic physical conditioning program. The blood samples were analyzed for T-4, T-3, T-7, and PBI thyroxine blood serum levels. Basal metabolic rates were determined at the beginning and at the end of the six-week daily systematic physical conditioning program, by the Open Circuit Method. Four volunteer subjects were selected to measure twenty-four hour thyroxine (T-4 and T-3) blood serum levels. Eight blood samples were drawn from each of the four subjects during one twenty-four hour period at three-hour intervals. An analysis of the results of these data indicated that there was a statistically significant increase in organic fitness, at the .01 level, as measured by Astrand's and Astrand's Maximum Oxygen Uptake Prediction Test and Cooper's Twelve-Minute Walk/Run Test. There was no statistically significant increases or decreases in blood serum thyroxine (T-4, T-3, T-7 and PBI) levels due to the effects of increased states of organic fitness. The basal metabolic rates, as determined by the Open Circuit Method, indicated a statistically significant decrease due to increased states of organic fitness. Data gathered from the twenty-four hour thyroxine (T-4 and T-3) blood serum levels did not indicate evidence for a twenty-four hour thyroxine secretion cycle existing in the subjects tested. Within the limits of this study, it was concluded that: 1. A daily six-week systematic physical conditioning program had a significant effect upon increased states of organic fitness in human subjects tested. 2. There was a significant decrease in the basal metabolic rates of the subjects tested following participation in a daily six-week systematic physical conditioning program. 3. A daily six-week systematic physical conditioning program had no statistically significant effect upon blood serum thyroxine (T-4, T-3, T-7, and PBI) levels in the selected human subjects. 4. There was no observable twenty-four hour blood serum thyroxine secretion cycle in the human subjects tested.

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March 24, 1972
3:00 p.m.

THE EFFECT OF THE PHYSICAL ACTIVITY LEVEL ON SELECTED HEMATOLOGICAL VARIABLES IN ADULT WOMEN[1,2] Emily M. Haymes, Dorothy V. Harris, Margot D. Beldon, Joseph L. Loomis, and W. Channing Nicholas, The Pennsylvania State University.

In order to study the effects of habitual activity patterns on selected hematological variables, blood samples from seventy-six women ranging in age from 22 to 44 years were examined. Subjects were placed in one of three categories: trained (field hockey players examined at the United States Field Hockey Tournament), moderately active, and sedentary. Standard hematological methods were used for determining hemoglobin, hematocrit and red cell counts. Plasma iron and total iron binding capacity (TIBC) were determined photometrically. The maximal oxygen consumption was measured during the same testing session that the blood samples were obtained. Younger trained and moderately active subjects (aged 22-33) had significantly smaller mean red cell volumes, less plasma iron and lower TIBC saturations than did the younger sedentary subjects. The only significant hematological difference among the older subjects (aged 34-44) was a lower TIBC in the trained group. Linear relationships between the plasma iron level and both the hemoglobin concentration and the maximal $\dot{V}_{O_2}$ (l/min) were found in the trained group. Hemoglobin concentration was found to be linearly related to the maximal $\dot{V}_{O_2}$ (l/min) in both the trained and moderately active groups. Plasma iron level was positively related to the maximal $\dot{V}_{O_2}$ /kg of body weight in the moderately active subjects. Closer examination of plasma iron levels and the percent saturation of the TIBC suggest that approximately 25% of the trained women and 32% of the moderately active subjects were iron deficient ($\leq$ 70 μg.Fe/100 ml., $<$ 20% saturation). Only eight percent of the sedentary group appeared to be low in iron and only two of the seventy-six subjects were found to be suffering from iron deficiency anemia ($\leq$ 12 g Hb/100 ml., $<$10% saturation).

[1]The study was supported in part by the Sports Research Institute and a Faculty Research Grant from The Pennsylvania State University.

[2]The study was part of a broader study of the effects of habitual physical activity patterns of adult women on physical performance under the direction of Dorothy V. Harris.

Emily M. Haymes
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The Pennsylvania State University
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March 24, 1972

3:15 p.m.

A STUDY OF PLATELET COUNT, BODYFAT, AND HARVARD STEP TEST SCORE.
William P. Marley and A. C. Linnerud, North Carolina State University.

The purpose of this study was to examine the relationship between the platelet count, bodyfat, and Harvard step test score of 29 male subjects in the post-absorptive state. In addition, the platelet counts of 5 smokers were compared with non-smokers. Subjects rested for 5 minutes at the beginning of the testing period. A fingertip blood sample was then obtained and the platelet count determined by means of the Brecher-Cronkite method. One-percent ammonium oxalate was employed as the dilution fluid. Testing was concluded with the Harvard step test in a controlled environment room. Pearson product-moment correlation and correlation ratio (eta) calculations yielded no significant relationship ($P > .05$) between platelet count, bodyfat, or Harvard step test score. Subjects were divided into lean (9.9% and under), average (10-14.9%), overweight (15-19.9%), and obese (20% and above) bodyfat groups.* Analysis of variance (ANOVA) of their platelet counts revealed no significant difference ($P > .05$) between them. Closer observation of the data, however, indicated a subtle but nonsignificant platelet count increase with increasing bodyfat except for the obese group. This observation does not constitute compelling evidence regarding causality, but the small size (N=2) of the obese group obscured an apparent trend. Further study of these variables appears warranted. Harvard step test scores were then employed in sorting subjects into poor (45 and under), average (50-80), and above average (above 80) fitness groups. ANOVA revealed no significant difference ($P > .05$) between the platelet counts of these groups. An additional ANOVA calculated for the platelet counts of smokers, who averaged 17 cigarettes a day, and nonsmokers was also nonsignificant ($P > .05$). It was concluded that there is no relationship between platelet count and bodyfat, no relationship between platelet count and physical fitness, and that smoking does not induce a chronic change in platelet count.

*Skinfolds were obtained by the method of Pascale prior to the step test and converted to percent bodyfat with the Siri formula.

William P. Marley
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March 24, 1972
3:30 p.m.

NEW EQUATION FOR ESTIMATING PER CENT FAT OF ACTIVE ADULT MALES. W.B. Zuti, Kent State University; Lawrence A. Golding, Kent State University.

Thirty-nine anthropometric measurements were evaluated to determine their relationship to the per cent fat of 30 adult males 25-50 years of age engaged in a regular physical activity. Hydrostatic weighing was used to determine body density, with residual lung volume measured by helium dilution. Brozek and Key's formula was used to estimate per cent fat from body density. A step-wise multiple regression of the data indicated that body density and per cent fat could be predicted from three anthropometric measures. This equation using waist girth, right wrist diameter and pectoral skinfold had a multiple R = 0.93 and a standard error of ± 0.0056 density units and ± 2.19 for per cent fat. To validate this equation, an additional 30 active adult males were selected at random and tested in the same manner. Values for density and per cent fat were calculated using this new equation and compared to hydrostatic weighing values. The accuracy of estimation was shown to be excellent; r = 0.91. The data from the two samples were then pooled and a new multiple regression analysis was computed. This new analysis yielded an r = 0.92 between actual and estimated with a reduction in the standard error of estimate to ± 0.0055 density units and ± 2.09 % fat units. The new equations for active adult males are:

% fat = 7.2949 + 0.450933 (waist circumference in cm)
+ 0.409429 (pectoral skinfold in mm)
- 5.830195 (Rt. wrist diameter in cm)

Density = 1.0806 - 0.001187 (waist circ. in cm)
- 0.001076 (pectoral skinfold in mm)
+ 0.015306 (Rt. wrist diameter in cm)

The results indicate that this method of estimation provides an accurate method of body composition estimation when used on similar population of active adult males.

William B. Zuti
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March 24, 1972
3:45 p.m.

TCHENG-TIPTON EQUATIONS FOR PREDICTING AN OPTIMUM BODY WEIGHT FOR HIGH SCHOOL AGE WRESTLERS

Tse-Kia Tcheng, Ph.D.
Illinois State University

Charles M. Tipton, Ph.D.
University of Iowa

During the past years, problems associated with scholastic wrestlers "making weight" for their respective classes have created a state wide controversy that prompted the Iowa Medical Society and the Iowa High School Athletic Association to consider seriously whether it was scientifically possible to determine permissible "wrestling weights" for high school students having various body conformations. The purposes of this study were (1) to develop methods and/or equations suitable for use in predicting "optimum body weight" for high school wrestlers in Iowa, (2) to evaluate these methods and/or equations, and, (3) to cross-validate these methods and/or equations with data obtained from high school students from other states. Anthropometric measurements of (1) more than 2,500 students from 60 high schools in Iowa, and (2) approximately 800 Iowa state high school wrestling finalists during 1968, 1969, 1970, and 1971 were used in this study. The measurements obtained were body weight, standing height, hip width, chest width, thigh circumference, biacromial and bitrochanteric diameter, ankle diameter, wrist diameter, and skin-fold thickness measurements from six locations. The reliabilities and objectivities of all measurements ranged between .82 and .99. Two prediction equations--a long form and short form--were developed and evaluated. The multiple R for these equations was over .93. These new equations have been evaluated against (1) the Behnke method and (2) the skin-fold thickness (Brozek, Pascale, and Sloan) method of appraising body weight. The results were found to be satisfactory and have been recommended by the Iowa Medical Society for use in schools in Iowa. These equations have been used to predict optimum body weight for high school wrestling finalists from the state of Nebraska, Minnesota, and Washington, achieving correlations between predicted and body weight over .95

Tse-Kia Tcheng
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March 24, 1972
4:00 p.m.

25

VALIDATION OF A QUICK, SUBMAXIMAL TEST OF MAXIMAL OXYGEN UPTAKE. A. Eugene Coleman, Texas Tech University.

The purpose of this study was to validate a submaximal test for prediction of maximal oxygen consumption in fifteen male subjects between the ages of 20-26. The criterion measure was maximal oxygen uptake measured on a treadmill. The submaximal tests were (1) a continuous multistage treadmill test (MST) and (2) the Astrand-Rhyming nomogram. The submaximal treadmill test consisted of the following 5-minute walks: 1) 3mph, level grade 2) 4mph, level grade 3) 4mph, 4 degree grade 4) At this point, the treadmill grade was increased 4 degrees each 5 minutes while the speed remained constant at 4mph. The subject continued to walk on the treadmill until his heart rate reached 160 beats per minute. Heart rate and oxygen uptake measures recorded during the last minute of each 5-minute work interval (4-6 pairs) were used as criterion prediction scores. Paired heart rate and oxygen uptake values recorded at each sub-maximal work level and the predicted maximal heart rate for the subject were used to linearly extrapolate the maximal oxygen consumption value. Application of the analysis of variance technique indicated that no significant difference existed between the criterion and the two predictors. The average error of prediction, however, was 8 percent for the MST and 15 percent for the nomogram. The results of this study indicate that the MST yields a valid estimate of maximal oxygen consumption and is more accurate than several of the more commonly used tests. This research was supported by THEMIS Contract Number DAAD05-69-C-0102, between the U.S. Department of Defense and Texas Tech University.

Dr. A. Eugene Coleman
Dept. of Physical Education
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Lubbock, Texas 79409

March 24, 1972
4:15 p.m.

26

CONSTRUCTION OF A SUBMAXIMAL CARDIOVASCULAR STEP TEST FOR COLLEGE FEMALES. Chet Witten, Eastern Michigan University.

The main purpose of this investigation was to locate a submaximal heart rate response among college females that would accurately assess their cardiovascular fitness. Twenty-six female college students participated in the submaximal step test (hereafter referred to as the F-EMU Step Test) which consisted of alternating 30 seconds of stepping with 20 seconds of rest at a cadence of 24 steps per min. and 30 steps/min. on a 14 inch and 17 inch bench. Test results (time for heart rate to reach 168 beats/min.) correlated with the Balke Treadmill Test, Astrand-Rhyming prediction of maximum oxygen consumption, and maximum oxygen consumption direct, resulted in validity coefficients of .85, .77, and .59, respectively. A reliability coefficient of .95 was obtained. Energy cost requirements for the F-EMU Step Test range from oxygen consumption values of 1.193 L/min. (mean H.R. of 133 beats/min.) to 1.439 L/min. (mean H.R. of 167 beats/min.). It was concluded that if a heart rate response of 168 beats/min. on the F-EMU Step Test correlates as high or higher with the Balke Treadmill Test (T180) than heart rate responses of 174 or 180 beats/min. on the step test, it may be safer and certainly less strenuous, particularly for the female subject in poor condition.

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March 24, 1972

4:30 p.m.

A Comparison Of Methods Of Eliciting Maximum Oxygen Consumption During Treadmill Walking In College Women. Harold B. Falls and L. Dennis Humphrey, Southwest Missouri State College.

This study compared four methods of eliciting max $\dot{V}_{O_2}$ during treadmill walking in college women. Subjects were physical education majors(N=14). All subjects completed a conventional Balke test(2 min at 0% grade, 3.5 mph, followed by 1% grade increment/min to exhaustion), a short Balke test(2 min at 10% grade 3.5 mph, followed by 1%/min increment to exhaustion), and a constant load test (2 min at 0% grade, 3.5 mph, followed by immediately raising the treadmill bed to max grade reached in a previous Balke test and continuation of walking to exhaustion. A subgroup(N=6) also completed a fourth test designated a modified Balke(2 min at 0% grade, 3.5 mph, followed by 3% increments/min for 4-6 min, then 1%/min to exhaustion). $\dot{V}_{O_2}$ max, $\dot{V}_E$ max, max heart rate, and heart rate response pattern were recorded for each test. $\dot{V}_{O_2}$ response patterns were determined in two subjects. Heart rate was recorded on a physiograph. $\dot{V}_{O_2}$ and $\dot{V}_E$ were determined utilizing open circuit procedures. Temperature and humidity of the laboratory were controlled. All testing was done on separate days in the post-absorptive state and allowing for at least one day of rest between test days. Order of testing was randomized for each subject. Mean maximum $\dot{V}_{O_2}$ values in liters/min STPD were as follows:

	Balke	Short Balke	Constant Load	Modified Balke
Total Group(N=14)	2.39	2.41	2.40	
Subgroup(N=6)	2.50	2.51	2.52	2.49

Because of the small N, no statistical analyses were done on the subgroup. For the total group there were no significant differences in $\dot{V}_{O_2}$ and $\dot{V}_E$ max. Maximum attained heart rate for the constant load test was significantly lower than for the other tests. The short Balke, modified Balke, and constant load tests were considerably more economical of time than the conventional Balke. Inspection of the heart rate and $\dot{V}_{O_2}$ response curves indicates that the three shorter tests probably involve a greater demand on anaerobic power sources. They at least show a more rapid and intense overloading of the cardiorespiratory system. As a result of the stress involved in the shorter tests, our subjects expressed a preference for the conventional Balke test. It is our feeling that some untrained subjects are likely to stop exercising before reaching max $\dot{V}_{O_2}$ due to the greater discomfort involved in the shorter tests.

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March 24, 1972
4:45 p.m.

AEROBIC CAPACITY, PHYSICAL WORK CAPACITY AND STEP TEST SCORES IN COLLEGE WOMEN. William D. McArdle, Gary S. Pechar and Frank I. Katch, Queens College.

The interrelationships between max VO_2, PWC and Skubic-Hodgkins recovery heart rate test scores were determined in 41 untrained college women. Test-retest reliability of max VO_2 and physical work capacity scores on a treadmill test was also determined. In addition, the reliability and validity of a 3 minute step-test which we have successfully used in evaluating and grouping large numbers of college women will be presented. From the results the following conclusions are warranted. (1) The Balke treadmill test for eliciting max $\dot{V}O_2$ provides a highly reproducible (r=.95) means for assessing aerobic capacity in women. Reliability of step test scores and various PWC measures ranged from r=.78 to .92. (2) The highest validity coefficient (r=-.76) was obtained between max VO_2 (ml/kg-min) and the 5 to 20 second recovery rate from a 3 minute step test of moderate intensity (16" bench; 22 steps/min; $\bar{X}$ H.R. = 152 beats/min). The standard error of prediction from the regression line was $\pm$ 2.67 ml O_2 min which was lower than that for Skubic-Hodgkins or $PWC_{150, 170}$ or max data in the present subjects or for previously reported regressions including the well known Astrand-Rhyming test, and multiple items of the AAHPER Youth Fitness Test. This step test provides a practical convenient and valid means for assessing and grouping large numbers of students in terms of cardiovascular fitness.

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March 24, 1972
5:00 p.m.

VALIDATION OF THE OXYGEN CONSUMPTION COMPUTER. Ben R. Londeree, University of Missouri-Columbia.

The purpose of the investigation was validation of the Oxygen Consumption Computer (O.C.C.) via modified Douglas bag procedures utilizing the micro-Scholander gas analyzer. The final instrumentation included a 4.5L gas mixing chamber in the line prior to the O.C.C. along with a +6% calibration correction on the computer. Eleven college males were given incremental bicycle ergometer rides with workloads varied between 300 and 1500 kpm/min. The intraclass correlation between the two methods was 0.995 with a standard error of the estimate of 83ml. Actually the errors were much smaller at low consumptions and increased in a manner such that the percent error remained relatively constant. It was concluded that the O.C.C. is an excellent means of determining oxygen consumption during steady state exercise.

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March 24, 1972
5:15 p.m.

EFFECTS OF TIME OF DAY AND TEMPERATURE VARIATIONS UPON SELECTED PHYSICAL PERFORMANCE TESTS. Charles J. Ansorge, Ithaca College.

The purposes of this study were to investigate the effects of (1) various times of day and room temperatures upon the performance of selected physical performance tests and (2) changing the time of day at which subjects are retested upon their performance of the selected physical performance tests. The subjects (N=108) were randomly assigned to be tested at one of three times of day (9:00 a.m., 1:00 p.m., or 5:00 p.m.) and at one of three room temperatures (65°, 75°, or 85°F). Half of the subjects in the groups initially tested at either 9:00 a.m. or 5:00 p.m. were randomly assigned to be retested seven to eight weeks following their initial test at the same time of day. The other half of the subjects initially tested at 9:00 a.m. were retested at 5:00 p.m. and the remainder of the subjects initially tested at 5:00 p.m. were retested at 9:00 a.m. seven to eight weeks following their initial test. All of these subjects were retested at the same temperature as their initial test. Data were obtained for the following physical performance tests: (1) forearm-flexion strength, (2) reaction time, (3) arm-movement time, and (4) standing broad jump at the conclusion of a 30-minute adaptation period to the room temperature. Analyses of variance (A x B and Type III) were employed to determine whether any significant differences existed between treatment conditions, and the Scheffe' Test for Multiple Comparisons was used to determine where the deviation between the groups existed where a significant F-ratio was found. Because a Type II error was considered a more serious error to commit than a Type I error, a P of .10 was selected to denote statistical significance. Based upon the results of the study, it was concluded that (1) forearm-flexion strength scores appear to be a function of room temperature, (2) neither time of day nor room temperature can be said to affect standing broad jump scores, and (3) time of day cannot be said to affect forearm-flexion strength scores.

Charles J. Ansorge
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March 24, 1972

5:30 p.m.

BIORHYTHMS AND ACTIVITY LEVELS IN THE FREE-PLAY OF INSTITUTIONALIZED MENTALLY RETARDED CHILDREN.[1] Michael G. Wade, Children's Research Center, University of Illinois at Urbana.

The interaction between arousal to action of environmental stimuli and recovery from that activity was presumed to generate biorhythms in the activity level of children. Five profoundly retarded children (2 male and 3 female) played in single sex groups of two, three, and four in a specially constructed 20' x 20' playroom. The room contained tubular steel play apparatus designed to elicit play behavior in young children. The free play activity of the children was monitored via heart rate telemetry system with the children wearing a small transmitter at waist level. Data was continuously recorded during play sessions lasting up to two hours. The data were analyzed by ANOVA and spectral analysis to ascertain whether average activity level and biorhythms were susceptible to manipulation by variation of selected parameters (group size and sex) in the stimulus environment.

The ANOVA revealed no significant differences due to sex or play group size of the subjects. Power spectra of the play sessions produced a variety of biorhythms with no clear bandwidths indicated. A white noise test (Bohrer, 1970) tested the hypothesis that biorhythms faster than 24.5' per cycle were white noise, with alpha = .05. This hypothesis was rejected indicating that meaningful frequencies existed at cycles faster than 24.5 minutes per cycle. Nevertheless the biorhythm did not appear to show variance estimates as a function of sex or play group size.

[1]This investigation was supported in part by a research grant to the Motor Performance and Play Research Laboratory via the Adler Zone Center by the Department of Mental Health of the State of Illinois.

Michael G. Wade
Motor Performance & Play Research Lab
Children's Research Center
University of Illinois at Urbana

March 24, 1972

2:00 p.m.

MOTOR EDUCABILITY AND CHRONOLOGICAL AGE AS PREDICTORS OF ERRORS IN PERCEPTUAL-MOTOR DEVELOPMENT OF EDUCABLE MENTALLY RETARDED CHILDREN.[1] Colleen George, North Texas State University.

Fourteen educable mentally retarded children were given the Purdue Perceptual-Motor Survey and the Carpenter-Johnson Test of Motor Educability. The zero-order correlation between the two tests when corrected for shrinkage was 0.79. Chronological age added significantly to the regression equation for predicting Purdue performance from a knowledge of Carpenter-Johnson performance. The R when corrected for shrinkage was 0.89. Seventy-nine percent of perceptual-motor performance variance was associated with motor educability and chronological age. Conclusions were that the latter two variables are good predictors of the former.

[1]This study was supported by North Texas State University Faculty Research Funds.

Dr. Colleen George
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North Texas State University
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March 24, 1972

2:15 p.m.

ACQUISITION OF SKILL ON MOTOR AWARENESS TASKS BETWEEN KINDERGARTEN AND PRIMARY MENTALLY RETARDED CHILDREN THROUGH THE INDIVIDUALLY PRESCRIBED INSTRUCTIONAL SYSTEM. David Auxter, Slippery Rock State College; Mark Runac, Moon Township Schools.

The purpose of this study was to determine differences in learning on motor awareness related tasks between kindergarten children and primary mentally retarded children through the Individually Prescribed Instruction System. In addition, a formative evaluation was performed on the following: (1) The program used in the study in regards to the effectiveness of sequentially arranged activities and the use of criterion measures, and (2) Systematic procedures of implementing the Individually Prescribed Instruction System. Two groups of sixteen children each were formed for comparison. They consisted of one group of normal kindergarten children and another group of primary mentally retarded children. Each member of one group was matched with a member of the other group on comparable program entry levels in a hierarchical structured behavioral curriculum which was purported to develop kinesthetic motor awareness. Pre-program entry levels and post-program exit points were computed for each child in the study. Individual prescriptions were written to move each student optimally through a self-instructional, self-evaluative program of activities. The time allotted to this program was eighteen periods of activity. Rates of learning in the hierarchical developmental sequence of the program were computed from units gained from point of entry to exit at program termination for each child. A Wilcoxon Rank Sum Sign-rank Test was used to determine differences in the amounts learned between the groups. The .05 level of confidence was selected as the level of significance. The results of the study indicated the following: (1) There were no significant differences in the rate of learning in the motor awareness program between kindergarten and primary mentally retarded children. (2) Children entered the motor awareness program at different levels and there was considerable overlap in initial motor abilities between normal and mentally retarded children. (3) Children learned at different rates in the motor awareness program and there was considerable overlap in learning rates between normal and mentally retarded children. (4) All children made gains in the motor awareness program.

Mark Runac
Moon Township Schools
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March 24, 1972
2:30 p.m.

THE EFFECTS OF A TRAMPOLINE TRAINING PROGRAM ON BALANCE OF EDUCABLE MENTALLY RETARDED CHILDREN AGED FOURTEEN TO SIXTEEN YEARS.

Carol Josette Ebel, University of Northern Colorado.

The problem of this study was to determine what effects a trampoline training program would have on the static and dynamic balance of selected educable mentally retarded children aged 14 to 16 years. The population totaled 42 with an experimental group of 23 and a control group of 19. The children of both sexes, ranged in IQ from 46 to 86 as determined by the Stanford-Binet and Wechsler Scales, and were enrolled in the Special Education Program in Weld County, Greeley, Colorado. The experimental group's mean age was 15 years, 5 months with a mean IQ of 65; the control group's mean age was 15 years, 9 months with a mean IQ of 67. The 3 tests of static balance were standing on one foot with eyes closed, standing on one foot with eyes open, and standing heel-toe with eyes closed. The 2 tests of dynamic balance were rail walking a 4" wide beam, and a 2" wide beam, both 8' long. The two groups were pre and posttested and each experienced a program training period of thirty minutes a day, 5 days a week for 6 weeks. The control group was given a physical education program of volleyball, bowling, softball, basketball, social dance, and physical activities, whereas the experimental group was given trampoline training in a sequential task routine. The data were analyzed through a t-test for significance at the .05 level for a two-tailed test between the two groups and between the total groups within the study for a total of 7 comparisons. Pretesting indicated that the means of the total control and experimental groups were sufficiently similar in performance to assume both samples were drawn from the same population and comprised a homogeneous grouping. Posttesting indicated that the experimental and the control groups were both significantly improved in static balance. No significant differences were obtained in the dynamic balance (rail walking a 4" and 2" beam) testing between the two groups. None of the other comparisons produced statistically significant differences except for the static balance test of standing on one foot with both eyes open. This singular test was significant for both groups. In conclusion, the results of this investigation significantly showed that both a trampoline training program and a regular physical education activity program were effectual in improving static balance of EMR children, aged 14-16 years; however, regarding dynamic balance, the results of the study indicated that neither group was effectual in the improvement of such balance during the limited time of the study.

Dr. Carol Josette Ebel, Assoc. Prof.
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March 24, 1972

2:45 p.m.

35

COMPARISON OF SELECTED PHYSICAL EDUCATION PROGRAMS ON THE PHYSICAL PERFORMANCE OF DIFFERENTIALLY DIAGNOSED EMOTIONALLY HANDICAPPED CHILDREN. Donald Hilsendager, Temple University; Lester Mann, Montgomery County Intermediate Unit.

The purpose of the study was to determine the effect of three types of physical education programs on the physical performance of three groups of differentially diagnosed emotionally handicapped children. The three types of physical education programs were physical fitness, general coordination, and specific skill. The emotionally handicapped diagnoses included were aggressive, hyperactive, and withdrawn. Students in the Montgomery County Public School system special education classes were tested by psychologists to diagnose their emotional handicap. Male students between the ages of 8 and 14 who were diagnosed as either aggressive, hyperactive, or withdrawn were randomly assigned to four groups with an equal number of subjects being drawn from each diagnostic category. Ninety-six subjects were selected for the 1970 program, and another ninety-six were selected for the 1971 program. The four groups of subjects were randomly assigned to (1) physical fitness activities (2) general coordination activities, (3) specific skill activities, or (4) control. Treatment programs were implemented two hours daily for an eight-week period during the summer of 1970 and 1971. The 1971 program was a replication of the 1970 program but included different subjects. The instructors for the treatment programs were rotated one-third and two-thirds of the way through the summer to ensure equal time with each group. Thirty-six tests of physical performance were administered to the subjects before and after the eight-week training period. The tests were selected to measure: agility, balance, circulo-respiratory endurance, flexibility, dynamic strength, general coordination, kinesthesis, muscular endurance, power, specific skill, speed, and static strength. Data were analyzed via analysis of covariance. Significant differences were found on five of the 1970 and seven of the 1971 variables. The significant changes did not follow any previously identified physical performance factor design. The physical fitness treatment group demonstrated superior performance on a majority of the variables where significant differences were found. It was concluded that participation in physical education activities results in improved physical performance of emotionally handicapped children but the nature of this improvement is not clear from the results of this study and appears to follow patterns different from that expected with "normal" children.

Donald Hilsendager
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March 24, 1972

3:00 p.m.

ATTITUDES TOWARD PERSONS WITH PHYSICAL DISABILITIES AS A FUNCTION OF INFORMATION LEVEL AND DEGREE OF CONTACT. Reginald W. Higgs, University of Saskatchewan.

The purpose of this study was to investigate the relative roles of information level and degree of contact on attitudes toward physically disabled persons. The data were gathered from 376 subjects divided into ten subject group classifications which included four secondary school groups, two groups of college undergraduates, and four groups consisting of counsellors and parents. Each individual subject was required to complete three measurement devices (A) Attitude Toward Disabled Persons Scale, (B) Knowledge Test About Specific Physical Disabilities and (C) Contact Rating Index. The results of the descriptive data analyses revealed that subject groups who possessed higher degrees of contact also possessed more information about physical disabilities and more positive attitudes toward physically disabled persons. Analysis of variance for knowledge level revealed significant differences in favor of female counsellors versus female parents, in favor of fathers of handicapped children versus fathers who had physically normal children, and in favor of senior high school males versus junior high males. Analyses of variance for level of contact revealed significant differences in favor of non-high school females versus high school males, in favor of female counsellors versus mothers, in favor of male counsellors and parents versus college males, in favor of male counsellors versus fathers and in favor of fathers who had a physically handicapped child versus fathers who did not. Analyses of variance for attitude revealed significant differences in favor of non-disabled college undergraduate women versus disabled college women, and in favor of non-high school males versus high school males.

Reginald W. Higgs
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University of Saskatchewan
Regina, Saskatchewan

March 24, 1972
3:15 p.m.

37

SELF-CONCEPT, BODY-IMAGE, SOCIAL-INTERACTION AND PERCEPTUAL-MOTOR CHANGES OF LEARNING DISABILITY CHILDREN. William C. Chasey, University of Texas at Austin, Austin, Texas.

Thirty children, categorized as having minimal brain injury (MBI) with resultant learning disabilities, were exposed to a concentrated 7 week physical developmental clinic, to observe the effects that the physical developmental program had upon self-concept, body-image, social-interaction, and perceptual-motor behavior. A Hawthorne group of 22 MBI children not enrolled in the developmental clinic served as controls for the investigation. Criterion measures were self and ideal-self concepts of the body; self and ideal-self choices of interpersonal situations: preference for activity type; and Cratty's Six-Category Motor Test. The developmental clinic provided a wide variety of gymnasium and playground activities, conditioning and coordination exercises, gymnastics, games, and modified clinic scores indicated: (a) no significant change in self or ideal-self choices for any item except leg length, ($P < .05$) interpersonal situation, ($P < .01$) (c) no significant difference in preference of activity type, ($P < .01$) and (d) a significant improvement in ball throwing and ball tracking ability.

Dr. William C. Chasey, Ph.D.
University of Texas
Austin, Texas

March 24, 1972
3:30 p.m.

A PROFILE OF PHYSICAL FITNESS LEVELS, PHYSICAL EDUCATION ATTITUDE, AND PROFESSED SELF CONCEPT FOR JUNIOR HIGH SCHOOL GIRLS, 1968-71.*

Owen J. Holyoak and Robert E. Allen, University of Florida.

The purpose of this longitudinal investigation was to determine the patterns established by junior high school girls in the areas of physical fitness, physical education attitude, and professed self concept from October 1968 to May 1971. Subjects were 42 junior high school girls enrolled in the Osceola Junior High School, Ocala, Florida, from September 1968 to June 1971. Osceola Junior High School was a demonstration school for the ESEA Title III Project for Physical Education centered in Ocala, Florida, 1967-71. Subjects were girls enrolled in the 7th grade in September 1968 and successfully completed the AAHPER Physical Fitness Test Battery and Wear Physical Education Attitude Scale in October and April for the 1968-69, 1969-70 and 1970-71 school years. Professed self concept data were obtained twice per year during the 1969-70 and 1970-71 school years. Subjects were exposed to a physical education program using a wide exploratory base over the three year period. The results of the One Way ANOVA Technique show significant (P = .05) fluctuations in the areas of arm strength, muscular endurance of the abdominal muscles, agility, explosive power, speed, throwing ability and physical education attitude. Significant differences were not found in cardiovascular endurance and professed self concept which includes the factors of autonomy, interpersonal adequacy, physical appearance and teacher-school.

*This study was supported, in part, by the ESEA Title III Physical Education Project, Ocala, Florida, 1968-71.

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March 24, 1972

3:45 p.m.

A STUDY OF THE LONGITUDINAL CHANGES IN THE PHYSICAL FITNESS LEVELS, PHYSICAL EDUCATION ATTITUDES AND PROFESSED SELF CONCEPTS OF ELEMENTARY SCHOOL BOYS AND GIRLS, 1969-1971.* Owen J. Holyoak and Robert E. Allen, University of Florida.

Subjects were 46 boys and girls enrolled in Eighth Street Elementary School, Ocala, Florida, from September 1969 to June 1971. Eighth Street Elementary School was a demonstration school for the ESEA Title III Physical Education Project. The physical education program at Eighth Street was judged to be of high quality by the investigators. Subjects were selected on the basis of having completed four administrations of the nine tests administered during their fifth and sixth grade school years. The tests used in this study included the seven items on the AAHPER Physical Fitness Test Battery, the Holyoak-Allen Attitude Scale for Elementary School Children, and the Gordon "How I See Myself" Scale. Tests were administered in October 1969, April 1970, October 1970 and May 1971, under the supervision of the ESEA Title III Project Evaluation Coordinator. The data were analyzed using the One Way ANOVA with Repeated Measures to determine if changes occurred in the variables tested. The results indicated, with the exception of boys pull ups and girls sit ups, significant ($P = .05$) positive changes occurred between test periods 1 and 4 in each of the physical fitness variables examined. The physical fitness test results reflecting the summer months (2 vs 3) showed only one significantly ($P = .05$) positive change, this occurred in the 50 yard dash times for girls. No significant ($P = .05$) changes were noted for boys or girls in their reported attitudes toward physical education or their professed self concepts related to the factors of autonomy, interpersonal adequacy, physical appearance and teacher-school. Based on the data reported in this investigation the following conclusions appeared warranted regarding the subjects tested: (1) physical fitness levels may be improved significantly ($P = .05$) when students are exposed to a quality physical education program; (2) the absence of a quality physical education program during the summer months may significantly ($P = .05$) affect the rate of improvement of physical fitness levels during that period; (3) a quality physical education program helps maintain a positive attitude toward physical education; (4) the professed self concept levels of fifth and sixth grade boys and girls remain relatively stable.

*This study was supported, in part, by the ESEA Title III Physical Education Project, Ocala, Florida.

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March 24, 1972
4:00 p.m.

A LONGITUDINAL ANALYSIS OF A MEASURE OF KINESTHESIS OF ELEMENTARY SCHOOL CHILDREN. Jos A. N. Truyens, The University of Toledo.

Relatively few studies of kinesthesis have been reported with elementary school children. The purpose of this study was to investigate changes in a measure of kinesthesis in upper elementary school children over a period of three years. The subjects, (N varied between 170-238) who participated in the "Toledo Growth Study" were tested at the end of the fourth, fifth, and sixth school year. An arm positioning task was used as a measure of kinesthesis. The kinesthesiometer (devised by the author) consisted of a lever that could be adjusted to different heights. The subject's arm which was at right angles with the kinesthesiometer, was strapped to the lever with the head of the humerus on the lever's pivot point. The blindfolded subject practiced the arm positioning four times, by moving the arm to a 90 degree angle which was indicated by a stop. The subject would then repeat the arm position from memory. The reproduced angle was recorded to the closest degree. Both left and right arm were tested. Reliability figures ranged from .70 to .80 for both measures and for boys as well as for girls. The results indicated no differences in measures between boys and girls. The mean angles did not change significantly during the three year period and, both boys and girls generally tended to underestimate the 90 degree standard. The reproduced angles ranged from 83 to 89 degrees. The variability of the measurement decreased for both boys and girls over the three year period. The standard deviations ranged from approximately 10 degrees for the first year to 8 and 7 degrees for the second and the third year. The correlations between the reproduced angles of the right and left arms for the girls decreased from .45 for the first year, .28 for the second year to .16 for the third yea . For the boys these values were .52 (first year), .27 (second year), and .36 for the last year.

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March 24, 1972
4:15 p.m.

RELATIONSHIPS BETWEEN SOCIAL STATUS AND PHYSICAL MEASUREMENTS OF BOYS AND GIRLS FROM THE FOURTH THROUGH THE SIXTH GRADES.

Dr. Jan Broekhoff, The University of Toledo.

The purpose of this study was to investigate the relationships between measures of social status and selected structural and functional physical variables for a mixed longitudinal sample of upper elementary school children. The subjects (N varied from 170 to 238), who participated in the "Toledo Growth Study," were tested for the physical variables at the end of the fourth, fifth, and sixth school year. At these times a sociometric questionnaire was administered which yielded acceptance-rejection scores in the areas of Friends, Homework, and Sports. These sociometric scores were correlated with the structural and functional physical variables through product-moment correlation procedures. The coefficients were tested for significance at the .01 level. The analysis warranted the following observations: (1) There was a relatively high agreement among boy and girl raters with regard to the three sociometric categories Friends, Homework, and Sports. The correlations clustered around .800. The agreement between boys and girls in the rating of their peers was considerably lower (r's ranging from .425 to .765). (2) Wherever the relationships between social status and structure reached significance they were negative. For the girls these negative relationships were most outspoken at the end of the fourth grade; for the boys at the end of sixth grade when rated by the girls. The highest correlations were obtained with girth and fat fold measurements. (3) The relationships between the measures of social status and the functional variables were consistently positive. For the boys, these relationships became progressively higher from fourth to sixth grade for both girls' and boys' ratings. The highest correlations exceeded .600 and were observed in the Sports, and Friends categories. Very few coefficients in the Homework category exceeded .300. For the girls, the relationships between social status and the functional variable were substantially lower than for the boys, especially in the fifth and sixth grades. The standing broad jump, the softball throw, pull-ups, and Rogers' Physical Fitness Index consistently showed the highest relationships with the measures of social status for both boys and girls.

Dr. Jan Broekhoff
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March 24, 1972
4:30 p.m.

DENTAL ERUPTIVE STATUS AND MOTOR FITNESS OF BOYS. Dr. Paul M. Lepley, University of Maine at Orono.

This study was designed to determine if boys advanced in dental eruptive status differ from boys retarded in dental eruptive status in selected measures of body size and motor performance. The two specific problems were: (1) to determine if boys advanced in dental eruptive status differ from boys retarded in dental eruptive status in body size as measured by standing height and body weight, and (2) to determine if subjects with advanced dental eruptive status score higher or lower in selected tests of motor fitness than do subjects in the low group of dental eruptive status at each chronological age, seven through twelve years. Dental eruptive status as indicated by the number of permanent teeth erupted into the oral cavity at the time of the oral examination, was used as the criterion variable. The experimental variables included standing height, body weight, grip strength, standing broad jump, leg lift, bench push-ups, 60-yard shuttle run, 120-yard shuttle run, endurance ratio, and balance beam walking. The following conclusions are based on the findings of this study and apply to the population investigated: 1. Boys who are advanced in dental eruptive status are taller and heavier than boys of corresponding ages who are retarded in dental eruptive status. This conclusion applies generally throughout the age range of seven through twelve years. 2. Boys who are advanced in dental eruptive status are stronger in grip strength and gross body strength (as determined by leg-lifting scores) than boys of corresponding ages who are retarded in dental eruptive status. 3. Boys who are advanced in dental eruptive status are superior in muscular power (as measured by standing broad jump) to boys of corresponding ages who are retarded in dental eruptive status. 4. Boys who are advanced in dental eruptive status do not differ in speed and agility (as measured by 60-yard shuttle run) from boys of corresponding ages who are retarded in dental eruptive status. 5. Boys advanced in dental eruptive status do not differ in body balance (as measured by balance beam walking) from boys of corresponding ages who are retarded in dental eruptive status. 6. The results of this investigation provide no basis for conclusions regarding the cardio-respiratory endurance characteristics of boys advanced or retarded in dental eruptive status.

Dr. Paul M. Lepley
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March 24, 1972

4:45 p.m.

A CLIMBING TEST FOR KINDERGARTEN CHILDREN. William L. Hottinger, Wake Forest University.

The purpose of this study was to devise a practical climbing test for use in evaluating climbing ability of kindergarten children. In order to make the climbing test practical, the following criteria were used in the selection of the test items: 1. The climbing tests would represent a range or scale of climbing items whereby the climbing tasks would progress from easy to difficult. 2. The climbing items could be used to improve climbing ability. 3. The climbing test items could easily be duplicated. A pilot study using 35 kindergarten boys and girls was conducted to select appropriate climbing items for this study. Nine test items were selected from a battery of 15 items. One hundred and forty-six kindergarten boys and girls were tested on nine climbing items which were: 1. ladder - 60^{o} incline, 2. rope ladder - bottom secured, 3. rope ladder - bottom free, 4. pole, 5. rope - bottom secured, 6. rope - bottom free, 7. overhead ladder - 15^{o} incline, 8. overhead ladder - 25^{o} incline, 9. rope- use of hands only. The distance up to a maximum of 5 feet was recorded. The method of climbing was also recorded for the children who climbed three feet or more. The results show that 100 percent of the children tested climbed 5 feet on test item no. 1, 93% climbed 5 feet on test item no. 2, 70% climbed 5 feet on test item no. 3, 37% climbed 5 feet on test item no. 4, 32% climbed 5 feet on test item no. 5, 25% climbed 5 feet on test item no. 6, 14% climbed 5 feet on test item no. 7, 2% climbed 5 feet on test item no. 8, and .68% climbed 5 feet on test item no. 9. The children used a "marktime" and "alternating the feet" method of climbing in ascending and descending on test items no. 1, no. 2, and no. 3. The majority of the children pressed the pole or rope with the soles of their feet in test items no. 4, no. 5, and no. 6. The children used a "mark time" or "alternating the hands" in climbing items no. 7 and no. 8. The children used a hand-over-hand method of climbing on test item no. 9. The conclusions were that the test (1) becomes progressively more difficult with each climbing item and (2) is capable of evaluating kindergarten age children who have a wide range of climbing ability.

William L. Hottinger
Department of Physical Education
Wake Forest University
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March 24, 1972

5:00 p.m.

A PLASTIC BALL TEST FOR GOLF IRON SKILL. Doyice J. Cotten, Jerry R. Thomas, Georgia Southern College; Thomas Plaster, Manatee High School.

The purpose of this study was to construct a plastic ball test of the ability to use golf irons which would be both valid and administratively economical. Following a pilot study, seventy subjects, representing a wide range of golf ability, were administered the experimental test. The test consisted of ten swings at plastic whiffle golf balls with each of the 3, 5, 7, and 9-irons. Each swing was scored depending upon where the ball landed on a target grid. Point values of the grid ranged from four to zero points. The two criteria used for validation of the test were tee-to-green scores for 18 holes of golf and skill ratings by three qualified judges. Test-retest reliabilities of the test scores were satisfactory and intercorrelations among the three judges were high. Canonical correlation, which allows both the predictor and criterion variables to be weighted for optimum correlation, was used. This procedure yielded an R_c of .82 between the four irons and the two criteria. From subsequent stepwise multiple regressions, it was learned that the Pearson product correlations of .76 and .75 between the 7-iron and the two criteria were not increased significantly by the addition of other predictors. The influence of wind upon the test scores was investigated. Results revealed that scores were slightly lower with a wind present, however, scores with and without wind present correlated highly. It was concluded that either the entire battery (R_c = .82) or the 7-iron alone (r = .76, .75) would be satisfactory for measuring golf iron skill.

Doyice J. Cotten
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March 24, 1972
5:15 p.m.

THE CONSTRUCTION AND STANDARDIZATION OF A WRESTLING KNOWLEDGE TEST FOR COLLEGE MEN MAJORING IN PHYSICAL EDUCATION. George C. Kraft, Hope College.

The purpose of this study was to develop a test that would measure the knowledges and understandings of college physical education majors who were completing a course of instruction in wrestling. This study was divided into four basic categories which were: (1) planning the test, (2) formulating the test (3) experimental tryout of materials (4) administration and analysis of the final test. Two pre-tryout tests of 75 items each were constructed and administered to a class of physical education majors at Western Michigan University. From this pre-tryout administration, two 50 item examinations were developed and administered to 723 physical education majors at 21 institutions throughout the United States. A final test of 50 direct question, multiple choice items was administered to 339 physical education majors at 13 institutions between February 10 and May 18, 1970. 1. The reliability coefficient as determined by the Kuder-Richardson formula was .85. The corresponding standard error of measurement was 3.09. 2. The Spearman-Brown reliability coefficient was .87, with a corresponding standard error of measurement of 2.92. 3. All item difficulties on the final test ranged between 22 and 90 percent. 4. All point-biserial correlations ranged between .13 and .53. One may conclude that the final test is a valid and reliable instrument for measuring the knowledge and understanding of college men physical education majors who are completing a course of instruction in wrestling.

Dr. George Kraft
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March 24, 1972

5:30 p.m.

EFFECTS OF TRAINING TWO DAYS PER WEEK AT VARIED INTENSITIES ON MIDDLE-AGED MEN. Michael L. Pollock, Jeffrey Broida, Zebulon Kendrick, Henry S. Miller, Jr., Richard Janeway, A. C. Linnerud, Wake Forest University.

The purpose of this investigation was to determine the effects of training 45 min, 2 days per week, at varied intensities on physiological measures of middle-aged men. Twenty-two men between 30 and 45 years of age ($\bar{X}$ = 38.7) were randomly assigned to one of two experimental groups. Group I trained at 90% of maximal heart rate and Group II at 80% for a total of 20 weeks. Twelve controls (Group III) of similar qualifications were also evaluated. Exercise sessions were closely monitored on a quarter-mile track with total distance trained being equal for both groups. Intensity was estimated by the palpation technique (beats/10 s) at 15, 30, and 45 min. of training. Training results showed Group I and II averaged 4.2 miles, and 509 Kcal per exercise session. Group I trained 44.4 min. a day at 90% of maximal heart rate (173.0 beats/min) and Group II 47 min at 80% 161.5 beats/min). Both experimental groups improved significantly in cardiovascular function, while spirometry and body composition measures remained relatively constant. This was shown by increased max VO_2 from 36 to 43 (+19%) and 38.5 to 44 ml/Kg · min (+14%), max V_E from 132 to 147 (+11%) and 126 to 139 l/min (+10%), and max O_2 pulse from 15.6 to 18.9 (+21%) and 16.9 to 19.8 ml/beat (+17%) for Groups I and II, respectively. Group I showed a significant reduction in skinfold fat from 149 to 138 mm. Group III remained constant in all variables. Training 2 days/week had a significant effect on cardiovascular function, but little effect on body composition. It appeared that when Kcal. expenditures were held constant, differences in intensity had little effect.

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March 25, 1972
10:45 a.m.

THE EFFECT OF VARIOUS DEGREES OF RAPID WEIGHT REDUCTION AND REHYDRATION UPON METABOLIC RESPONSES TO STEADY STATE EXERCISE

William G. Herbert, Virginia Polytechnic Institute and State University; Paul M. Ribisl, Kent State University.

The purpose of this study was to determine the influence of various levels of rapid weight reduction and subsequent forced rehydration upon metabolic and respiratory function during steady state treadmill exercise. After a preliminary training period, 10 college wrestlers were tested in one Control Series, where normal body weight was maintained, and three Experimental Series where weight was reduced by 3%, 5%, or 7%. In each Series, subjects were examined at normal weight (Norm), reduced weight (Dehyd) given 48 or 72 hr after the Norm test, and two rehydrated weight ($Rehyd_1$ and $Rehyd_2$, given 5 hr and 7 1/2 hr after Dehyd) conditions. Carbonated Gatorade was used during forced rehydration, and a diet composed exclusively of high protein food supplement was consumed ad libitum during weight reduction. The data were analyzed using two-way ANOVA for repeated measures and subsequent application of the Newman-Keuls test, where appropriate. Following Dehyd, statistically significant ($P < .01$) alterations in the oxygen requirement for exercise (ml/kg/min), R.Q., respiratory rate and tidal volume, indicating decreased efficiency were observed. However, these adjustments were probably not large enough to impose physiologic limitations on performance. After $Rehyd_1$ and $Rehyd_2$, nearly all responses showed improvement, implying full recovery. Impairment in Dehyd was attributed mainly to increased lipid utilization originating from negative caloric balance during weight reduction while recovery after $Rehyd_1$ was thought to be related to increased carbohydrate availability via ingestion of Gatorade. Wrestlers who rapidly reduce their weight beyond 3% will experience slight impairment in metabolic efficiency; however, if concerted efforts are made to replace all fluid deficits with a sugar-water solution, complete performance recovery can occur.

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March 25, 1972
11:00 a.m.

ENDURANCE PERFORMANCE OF GOOD AND AVERAGE WOMEN COMPETITORS UNDER SELF-MOTIVATED AND COMPETITIVE CONDITIONS. Susanne L. Higgs, University of Saskatchewan.

Two groups (N=20), one classified as highly competitive and the other as average in competitiveness, were selected by observational techniques from 46 women physical education majors. Maximal oxygen intake was established for each subject utilizing Taylor's intermittent treadmill technique. Following this testing, each subject underwent two all-out performance runs at the work level which had elicited her maximal oxygen intake. The first performance run was done under self-motivated conditions in which no verbal motivation or extrinsic incentives of any kind were given to the subject. The second performance run was completed under competitive conditions. Two treadmills were set up side by side and two subjects, paired on the basis of their previous performance times, ran simultaneously, competing against each other. The mean performance time of the good competitors exceeded that of the average competitors under both experimental conditions ($.05 > p < .10$). Competitive motivation increased the mean performance time of both groups approximately 30 secs. ($p < .10$). The average maximal oxygen intake for all subjects was 41.31 cc./kg/min. and the mean run time (self-motivated) at the work level which had elicited maximal oxygen intake was 4:35.8 min.

Susanne L. Higgs
Department of Physical Education
University of Saskatchewan
Regina, Saskatchewan

March 25, 1972

11:15 a.m.

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VOLITIONAL CONTROL OF HEART RATE DURING EXERCISE STRESS.

Victoria A. LeFevers, Eastern Illinois University; Joel Rosentswieg, Texas Woman's University.

Volunteer college women (N = 35) were divided into 3 groups to determine if heart rate could be conditioned instrumentally and lowered during exercise stress on the treadmill. The 3 groups were composed of 15 Ss who received instrumental conditioning with visual feedback--Experimental Group I; 9 Ss who received instrumental conditioning with no visual feedback--Experimental Group II; and 11 Ss who received no conditioning--Control Group. All experimental Ss experienced 10 days of instrumentally conditioned learning, attempting to meet the criterion of learning--lowering the heart rate 10% of the resting heart rate upon 3 of 4 trials presented each day, for 2 consecutive days, while in the resting position. After the conditioning period, the conditioned stimulus for heart rate lowering was presented to all Ss in each of the 3 groups upon 4 levels of exercise stress--heart rate 100-120 bpm, 120-140 bpm, 140-160 bpm, and 160-180 bpm. Analysis of variance and Duncan's Multiple Range Test yielded significant differences between Experimental Group I and Control Group at all levels, and between Experimental Group II and Control Group at each level except 100-120 bpm ($p < .01$). It was concluded that volitional control of heart rate may be successfully accomplished under exercise stress. Control of the heart rate in a resting state appears to transfer and facilitate heart rate lowering under exercise stress.

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March 25, 1972

11:30 a.m.

AN ANALYSIS OF CARDIAC AND RESPIRATORY CHARACTERISTICS OF A NATIONAL CHAMPIONSHIP CROSS COUNTRY TEAM. Larry Thirstrup, Fort Hays Kansas State College and H. Harley Hartung, Central Missouri State College.

The purpose of this study was to investigate the cardiac function and respiratory characteristics of highly trained, national champion-level cross country runners. Six male college cross country athletes served as subjects. The runners were tested the first week following completion of their competitive season. Standard 12-lead electrocardiograms were recorded at rest. Ventilatory and vital capacity measurements consisting of forced expiratory capacity, forced expiratory volume (one second), maximum breathing capacity, and peak expiratory flow were measured to determine levels of respiratory functioning. All ECG measurements were analyzed by calculating the mean electrical axes and time components of three cardiac complexes in each lead. Significant trends were noted in each of the respiratory variables. The mean electrical axes of QRS and T were found to be normal except for one case of left axis deviation of the QRS (-47^{o}). The mean P-R, QRS and QTc intervals were also found to be normal. U wave occurrence was high in this sample (67%).

Larry Thirstrup, Dept of Health,
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March 25, 1972
11:45 a.m.

The Effect of 17-Hydroxycorticosterone on the Connective Tissue of the Adult Male Rat. Rulon S Francis, Brigham Young University.

Sixty male retired breeder rats ranging in weight from 335 to 550 grams were employed in an experimental study to determine if the corticosteroid hydrocortisone has a deleterious effect on the tendo Achilles. The experimental animals were randomly divided into three basic groups and identified as hydrocortisone, saline, and control. They were further divided into an exercise and a non-exercise group with ten rats in each basic group being subjected to a formal exercise routine in an animal exercise drum and ten rats in each of the basic groups relegated to no formal exercise. The exercise groups being subjected to physical stress were committed to run a distance of 1.6 kilometers an hour or 3.72 kilometers per week. The hydrocortisone and saline groups were injected with 0.2 cc. (10 Mg.) of hydrocortone acetate (hydrocortisone acetate, MSD) and sodium chloride respectively once a week for ten weeks. The injection site was anterior to the mid-tendo Achillis approximately one centimeter above the tuber calcanei on the lateral aspect of the right lower extremity. Every two weeks throughout the research period twelve rats were randomly selected from the three basic groups and sacrificed by ether anesthetization. The body weight of the experimental animal was recorded and the tendo Achillis under study was dissected and subjected to a tensile strength evaluation which provided the data for the study. On the basis of the findings concerning the effect of 17-hydroxycorticosterone on the tendo Achillis of the adult male rat, it may be said that: The corticosteroid hydrocortisone acetate has no deleterious effect on the tensile strength of the tendo Achillis; according to the data collected on the body weight differentials of the experimental animals the corticosteroid hydrocortisone acetate does affect the body weight of the adult male rat.

Rulon S Francis, Ph.D., Director of Prephysical Therapy, Brigham Young University, Provo, Utah 84601

March 25, 1972

2:00 p.m.

52

THE EFFECT OF AMPHETAMINE ON MAXIMAL ENDURANCE. G. Rankin Cooter, Western Kentucky University.

This study investigated the relative effects on the swimming endurance of adult, male, Wistar rats of 4, 8, 12, and 16 milligrams of dl-Amphetamine Sulfate per kilogram of body weight administered 30, 60, 90, or 120 minutes prior to testing. Twenty-three animals were tested under all possible dosage-absorption time sequences in addition to a control condition consisting of 1 cubic centimeter of distilled water administered 30 minutes prior to swimming. The 17 conditions were randomly assigned for all subjects. Every animal was weighed prior to testing, and the amount of drug administered was based upon that day's weight. After the proper absorption time had elapsed following the drug or placebo administration, the rat was forced to swim to the beginning stages of drowning with a load of 5.5 percent of its body weight attached to its tail. The time of each swim was recorded to the nearest second. The data were treated statistically using an analysis of variance with a 4x4 factorial arrangement of treatments in comparison with a control. The resulting F-ratio for the main effects of drug dosage and absorption time as well as for the interaction between the two factors were non-significant. When the control condition was compared against the combined effects of the experimental treatments, the resulting F-ratio was again nonsignificant. Hence, this study was unable to demonstrate an alteration in swimming endurance of rats which could be attributed to the ingestion of amphetamine.

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Dept. of Physical Education
Western Kentucky University
Bowling Green, Kentucky 42101

March 25, 1972
2:15 p.m.

PHYSIOLOGICAL EFFECTS OF METHANDROSTENOLONE WITHOUT TRAINING

Juris Terauds, University of Maryland, College Park
Jane M. Canter, M.D., Silver Spring, Maryland

The purpose of this study was to determine some of the effects on maximum recommended dosage of methandrostenolone would have over a fifty day period. The male subject received 5.0 mg of Dianabol in 2.5 mg dosages twice daily. During the fifty day administration period, no changes were made in the subject's normal daily schedule of activities or diet. Analysis before and after the fifty day period tried to determine (1) the levels of 17-ketosteroids, (2) amount of hemoglobin, (3) hematocrit, (4) presence of icterus, (5) leukocyte count, (6) differential count of white blood cells, (7) red blood cell morphology, (8) SGOT, and (9) SGPT. Further, a daily record was kept to note any changes in (10) appetite, (11) body weight, (12) resting heart rate, (13) libido, (14) voice or signs of, (15) nausea, (16) acne, (17) edema, and (18) hypersensitivity. Hand grip strength was also measured before and after the fifty day administration period. The analysis, measurements, and observation produced the following: (1) 17-ketosteroid, before 12.2 mgm/TV, after 10.1 mgm/TV, (2) hemoglobin, before 13.5 gms, after 12.7 gms, (3) hematocrit, before 41.0, after 40.5, (4) ecterus, normal with no change, (5) leukocyte, before 5,900, after 7,100, (6) differential count of white blood cells, before, granulocytes 62%, lymphocytes 34%, monocytes 3%, eosinophiles 1%, after, granulocytes 51%, lymphocytes 44%, monocytes 2%, eosinophiles 2%, and basophiles 1%, (7) red blood cell morphology showed slight anisocytosis, but essentially normal shape and appearances, after there were no signs of anisocytosis, (8) SGOT, before 38 units, after 18 units, (9) SGPT, before 50 units, after 5 units. Nausea was noted during the first day only. Body weight increased steadily from 176 to 186 pounds. Hand grip strength increased, R 140 to 148, L 105 to 115. A general feeling of well being was noted on day 5 through 9, while slight hypersensitivity developed during day 13, 14, and 15. An increase in libido was noted on day 14 and 17. There was no noticeable change in appetite, resting heart, or voice. Also, there were no signs of acne or edema.

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March 25, 1972

2:30 p.m.

EFFECT OF SMALL AND MODERATE DOSES OF ALCOHOL ON EXERCISE HEART RATE AND OXYGEN CONSUMPTION. Melvin H. Williams, Old Dominion University.

Since previous research involving the physiological effect of acute ethanol ingestion on oxygen uptake and heart rate response during exercise has revealed conflicting results, the purpose of this study was to provide basic information on the acute effects of a small and moderate dose of ethanol on oxygen consumption and heart rate before, during and after a progressive workload. Nine (N=9) conditioned male university faculty and students underwent three separate trials of a continuous nine-minute work task consisting of three minutes each at 500, 1000 and 1500 kpm. A Quinton electric bicycle ergometer was utilized, thus ensuring exact duplication of workloads during the three trials. Prior to each trial, the subjects consumed either a placebo (0.0cc/lb.), small (0.2cc/lb.) or moderate (0.4cc/lb.) dose of 190 proof ethanol. Adhering to standardized procedures in alcohol experimentation with humans, the dosages were designed to produce blood alcohol levels, respectively, of 0.00, 0.05 and 0.10. The main parameters of interest were heart rate and oxygen uptake during rest, exercise and recovery. The heart rate was monitored continuously via a graphically recorded EKG on a Narco physiograph, while oxygen consumption was detected by the Versatronics-Technology oxygen consumption computer, model OCC 1000, 10/40. A significant F ratio was obtained for the third minute of the 1000 kpm workload, and the Neuman-Keuls procedure revealed the heart rate during both alcohol conditions was significantly higher than the placebo phase. However, since the heart rate immediately preceding and following this level of exercise was not significantly differentiated under the three alcohol conditions, it was concluded that this single significant F ratio was due to chance expectations. Thus, the overall analysis by within-group t-test and repeated measures ANOVA supported the conclusion that neither a small nor moderate dose of ethanol significantly affected the heart rate or oxygen uptake during rest, exercise or recovery.

Melvin H. Williams
Human Performance Laboratory
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March 25, 1972
2:45 p.m.

THE EFFECT OF ACETYLSALICYLIC ACID INGESTION UPON MAXIMUM OXYGEN UPTAKE, MAXIMAL RUNNING TIME, AND OXYGEN DEBT OF HIGHLY TRAINED ENDURANCE ATHLETES. A. Garth Fisher, Phillip E. Allsen, [illegible]mo Roundy, Brigham Young University.

Nine highly trained athletes from the Brigham Young University cross country team were chosen as subjects for the study. After a pretraining period on the treadmill, the subjects were assigned to take one of three tests: (1) a regular maximum oxygen uptake test, (2) a maximum oxygen uptake test following placebo ingestion, or (3) a maximum oxygen uptake test after taking acetylsalicylic acid. The test schedule was randomly assigned so that there was no definite order for taking the three tests. Tests two and three followed ingestion of 15 grains of either placebo or aspirin administered via the double-blind technique. Capsules were administered 20 minutes prior to the test. Subjects fasted four hours prior to each test to control the effect of food in the stomach on aspirin absorption. Maximum oxygen uptake was determined using the standard open-circuit Douglas bag method with Scholander and electronic gas analysis. A modified Balke treadmill test schedule was used for assigning work loads with a running speed of 8 mph. Recovery oxygen and time were computed using a base level of mild treadmill exercise (3 mph, level grade). The total metabolic cost of recovery was recorded continuously using a Metabolic Rate Monitor which was placed on the subject immediately upon cessation of exercise while the treadmill was adjusted to the base level condition. Analysis of variance was used to test the differences among the treatments. The differences for all criterion measures were nonsignificant. Analysis of covariance was also used to test the differences in treatments for recovery time and oxygen debt for significance with running time as a covariant. Again, all differences were insignificant. The conclusion, therefore, is that aspirin (acetylsalicylic acid) has no effect upon the criterion measures of this study using highly trained endurance athletes.

A. Garth Fisher, Ph.D.
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March 25, 1972
3:00 p.m.

56

A COMPARISON OF DEXTROSE, GATORADE, AND TAKE-FIVE AS EROGOGENIC AIDS FOR ENDURANCE PERFORMANCE. Robert W. Patton, Northwestern State University; James W. Randolph, Jr., Northwestern State University.

The purpose of this study was to compare dextrose, Gatorade, Take-Five, and a non-nutritive placebo as dietary supplements for improving endurance performance on a treadmill test designed to simulate conditions under which they might be used.

Twenty male subjects in good physical condition were randomly assigned to the four treatment groups to accommodate a 4 x 4 latin square design. Each subject performed a graded treadmill test (three m.p.h. at zero % grade, with one % increment each two minutes unto exhaustion) under each of the four treatment conditions. The temperature and humidity ranged from 80-85 degrees and percent respectively; the duration of exercise approximated one hour of continuous work. The ergogenic aids were administered in such a manner as to control for assimilation time and motivation, and were prepared so as to appear identical in volume, taste, color, and consistency. No knowledge of results was made available to the subjects.

Following the treatment period the mean group gains in weight loss, duration of exercise, maximal heart rate, and maximal systolic blood pressure served as the dependent variables in an analysis of variance for treatment and sequence effects in the experiment. The resulting F ratios for both the treatment and sequence effects, when tested at the .05 level, were found to be of insignificant dimension on all dependent variables. The conclusions drawn suggest that the ergogenic aids utilized had no effect upon the endurance performance of the subjects in this study.

Robert W. Patton
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March 25, 1972

3:15 p.m.

57

THE EFFECT OF DEXTRO-AMPHETAMINE SULFATE ON INTEGRATED ACTION POTENTIALS AND LOCAL MUSCULAR FATIGUE. Gerald P. Graham and Ronald R. Bos, Kent State University.

The purpose of this investigation was to study the effect of d-amphetamine on the integrated action potentials and local muscular fatigue of the triceps brachii during isometric and isotonic work. The basic design included two groups of male college students, 18 in each group. One group performed an isometric exercise with the left triceps brachii, and the other group performed an isotonic exercise with the same muscle. The integrated action potentials were recorded electromyographically as the muscle contracted. The exercises were performed under varying loads and with the muscle tested first in a rested condition and then tested again in a fatigued condition. Maximum isometric strength, blood pressure, and heart rates were also recorded. Each subject was tested once with d-amphetamine (15 mg.), once with a placebo, and once in a controlled condition with no capsule. The sequence of testing was rotated and all capsules were administered on a double-blind method. The data consisted of the means of the centimeters of integrated action potentials over three second time periods. All data were statistically treated using the analysis of variance with repeated measures to test for significant differences between the means of the control, placebo, and d-amphetamine. The results showed that 15 mg. of d-amphetamine significantly decreased the integrated action potentials and local fatigue of the triceps brachii during the isometric contractions but had no significant effect during the isotonic contractions. Maximum isometric strength, blood pressures, and heart rates were significantly increased. It was concluded that, with certain limitations, the ingestion of d-amphetamine will not significantly delay the onset of local fatigue in most cases of muscular work. This conclusion is made in light of the fact that the majority of physical activities involve the isotonic movement of muscles and no significant decrease in muscular fatigue was obtained during the isotonic test.

Gerald P. Graham
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March 25, 1972
3:30 p.m.

THE DEVELOPMENT OF CRITERIA FOR THE STUDY OF GAMES IN AN ARCHAEOLOGICAL CONTEXT. Denise S. Green, University of California, Santa Cruz.

The purpose of this study was to develop specific criteria by which the function of an archaeological structure and/or related artifacts can be considered to be of a gaming nature. In developing these criteria, consideration was given to established archaeological methodology, research on the relationship between games and culture, and the nature of archaeological investigation. With reference to the latter, particular attention was given to the dependence upon inference inherent in archaeological research. Furthermore, an attempt was made to allow for the more recent use in archaeological investigation of deductive reasoning as compared to the traditionally-oriented inductive reasoning. The criteria developed by which the function of a set of like objects can be considered to be of a gaming nature were categorized into the same two basic sources of evidence, primary and secondary, which are examined when the function of any form of archaeological remains is being established. These two categories were subdivided as follows: primary--archaeological and ethnohistorical; secondary--archaeological, ethnohistorical, and chronological. These criteria were then applied to a specific archaeological problem, the Southwestern ball courts, in order to establish a preliminary test case.

Denise S. Green
Office of Physical Education
University of California, Santa Cruz

March 25, 1972

2:00 p.m.

THE PENTATHLETE IN EARLY OLYMPICS; A PICTORIAL ANALYSIS.

Robert E. Gensemer, University of Denver.

Through all ages of sport, there were no more splendid contests than those at Olympia. And the pentathlon, introduced in the eighteenth Olympiad, was the supreme match of those games. A combined competition in five events, the pentathlon represented an embodiment of the Greek ideal of harmony and balance. The pentathlete was recognized as the most accomplished of all contestants. Perhaps inferior to specialized athletes in any one particular event, the pentathlete was nevertheless superior in the general and harmonious union of strength and coordination; the perfect physical being to whom the great thinkers, notably Aristotle, gave particular commendation. By means of sequential ordering of photographs of statuary and paintings it is possible to critically compare ancient pentathlete styles with contemporary methods. In the first event, the 200-yard run (although the order of events is not agreed upon), the contestants can be seen to begin from a start with the feet very close together, then running well up on the ball of the foot, knees lifted high, and bodies erect. The arms were flung violently forward and back in an effort to assist the sprint. In the second event, the jump, competitors carried halteres (stone or bronze weights) in their hands to aid their jump. These halteres were a special symbol of the pentathlon, frequently being represented on statues of victorious pentathletes. Employing a few short steps prior to takeoff, the halteres were swung forward at the jump, then backward when the athlete was in the air. Principles of physics dictate that this practice did indeed aid the jump but offered no advantage when the jumper was airborne. Next was the discus throw. The athletes utilized no complete body turn, but are seen to release the discus from a crouched start, a short step forward, and an upward swing of the arm and turn of the body. In the fourth event, the javelin toss, the competitors attatched an amentum (thong) to the shaft of the javelin and inserted their fingers in the free end in such fashion as to increase either the distance or the accuracy of the throw. The javelin is seen to be thrown usually after a short run, a twist of the body, and an overhand release similar to today's style. In the final event, combatants engaged in upright wrestling, two of three throws. In no other event can such a variety of style be demonstrated, although some maneuvers still survive, most notably the flying mare. By photographic analysis it can be seen that, in all five events, modern athletes have employed far greater mechanical advantage than did the ancients.

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March 25, 1972

2:15 p.m.

SPORT AND THE SOCIAL MILIEU OF EIGHTEENTH AND NINETEENTH CENTURY AMERICA. Richard Wettan, Queens College.

The social milieu of sport in eighteenth and nineteenth century America is particularly important because the factors which helped the growth of sport continue to be driving forces in modern America. This paper will attempt to explore some of the factors which influenced the rise of sport: cultural heritage, religion, urbanization, nationalism, sectionalism, boosterism, and social class. Data were obtained by examining the newspapers, magazines and books from the period studied. Some secondary source books were also used. In the early colonial period, excluding the Indians, this country was void of national customs, culture, and traditions. Every new group that came to this country had an effect on it. Eventually America developed customs and traditions of its own, and it began to export its culture to the rest of the world. The same is true of sports. Originally the United States was void or near void of a national sporting and recreational tradition. Many societal factors had to change in order to bring about an atmosphere conducive to sport. Once this change took place sports grew in variety and influence. In our modern society sport not only reflects our life style, but it is a major factor to be considered in any study of our society as a whole.

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March 25, 1972
2:30 p.m.

GA 55

Title: The Formative Years of Women's College Basketball in Five Selected Colleges 1880-1917

Author: Virginia L. Evans

The investigator studied the formative years of basketball; the period from 1880 to 1891 was designated as the period of readiness and the time from 1892 to 1917 as the period of growth and development of basketball. The period of readiness was researched to determine the extent of the effect that physical training programs, student leisure activities and sporting garments had on the acceptance of basketball. The second period was examined to ascertain the effect of programs of instruction, student's reactions and physical educator's opinions on the growth and development of basketball. The viewpoints of administrators, physical educators, and students from five private eastern women's colleges (Mount Holyoke, Goucher, [Women's College of Baltimore], Smith, Vassar, and Wellesley) were examined. It was concluded that basketball for college women was introduced at an opportune time when both the students and the instructors were willing to experiment with a new sport. Acceptance was immediate by the students with formal acceptance slow by the professional physical educators. Students quickly established the sport as one of the more popular student recreational activities. Women physical educators sought to control the sport for the explicit purpose of benefiting the students.

Virginia L. Evans
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March 25, 1972
2:45 p.m.

MAJOR THEMES OF UNDERGRADUATE PROFESSIONAL PREPARATION IN PHYSICAL EDUCATION FROM 1860 TO 1962. Jack L. Rocker, University of Hawaii.

The purpose of the study was (1) to identify recurring themes of undergraduate professional preparation in physical education in the United States as revealed in three national professional preparation conference reports of 1948, 1959, and 1962, and (2) to trace the origin and development of these themes as revealed in selected professional literature dealing with the years 1860 to 1962. Analysis of the three national conference reports resulted in the identification of six major themes of undergraduate professional preparation in physical education, as well as numerous operational principles and program techniques in support of the six themes. Themes, principles, and techniques were organized in a check-list of seventy-six concerns about professional preparation. Using content analysis as the method of investigation and the check-list as an organizational device, data were gathered from selected literature dealing with the period 1860 to 1962 which revealed the origin of themes, principles, and techniques, and the developmental process they underwent. Within the limits of the study, the findings resulted in a statement of the following generalizations: (1) the years 1860 to 1899 comprised a beginning period in which the six major themes were first expressed and in which seventy-one of the seventy-six check-list items first appeared as concerns, (2) the years 1900 to 1962 marked a period of development and refinement in which the six major themes persisted as recurring assertions and in which no new themes appeared, (3) as new concerns were expressed from 1860 to 1962, they took their place with older concerns in an additive fashion rather than replacing them, and (4) during the last twenty years of the nineteenth century, professional leaders in physical education promoted those alternatives for leadership preparation, governing authority, and research methods which tended to inhibit freedom conducive to change after 1899.

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March 25, 1972
3:00 p.m.

A HISTORICAL STUDY OF PROFESSIONAL ASSOCIATION FOOTBALL (SOCCER) IN ENGLAND DURING WORLD WAR II. John R. Schleppi, University of Dayton.

The purpose of this study is to examine the role of sport in a country under the stress of modern warfare. Newspapers of England, soccer books, records of the governing bodies of soccer, selected club records based on war involvement, and public records were examined. Players, newsmen, referees, and club officials, and others who were part of the war scene were interviewed. The usual historical research procedures were used in the study. The research was done in England in the spring of 1971. Soccer played a major part in the recreational life of England during the Second World War. During the war between 75 to 95 percent of the clubs functioned each year. Even though there were severe restrictions due to the war, the game continued. This was due to the sound administrative structure and almost complete public and governmental, including military, support. The war structure of professional soccer, coupled with the sometimes herculean efforts of the few persons remaining at the clubs to keep them going, produced a fast recovery following the war with only one year needed for a post war "transitional" period. The game practically no criticism (that is, saying it was detrimental to the war effort) from public or government. Except for taxes and necessary limitations the game gained governmental support as evidenced by the ground rebuilding during and immediately following the war. Most newspapers, even when paper was scarce, carried sports news. However, only one or two exclusively sports publications continued during the war. A very heavy program of other sports, each with some organizational modifications, as well as the betting and pools attached to professional sport, almost flourished at times, though this latter certainly drew much criticism. Thus although modern warfare involves nearly a whole society in its complicated machinery, sport, especially games of national interest, develops its organization to a high point to: 1) maintain a feeling of "normalcy". Sport was one of the few things people could look forward to from week to week, and one which gave them a feeling of fighting or working for a normal culture. 2) maintain civilian morale by diversion during leisure time. 3) help avoid cultural shock that might result from the loss of an implanted activity. In conclusion, sport contributed to the war effort in an intricate way, not just as an escape mechanism.

John R. Schleppi
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March 23, 1972
3:15 p.m.

A COMPARISON OF OXYGEN DEFICIT AND OXYGEN DEBT IN SUBJECTS OF HIGH AND LOW FITNESS. Thomas P. Martin, State University of New York, Brockport.

This study investigated the oxygen-deficit, oxygen-debt relationship in subjects of high and low fitness. Thirty-five adult males volunteered for the study. Each subject's maximum oxygen uptake (ml/kg/min) was determined, and these values were rank ordered. The top seven subjects were chosen to represent a high fitness group, and the bottom seven were chosen to represent a low fitness group. Thus, the results of the study were limited to the performance of these final 14 subjects. Each subject was tested on a bicycle ergometer at work loads of 450, 750, and 1,050 kg-m/min. Testing sessions were 46 minutes in length and consisted of 10 minutes of unloaded pedaling (pre-exercise period), 6 minutes of loaded pedaling (exercise period), and 30 minutes of unloaded pedaling (recovery period). Expired gas was collected during the pre-exercise, exercise, and recovery periods and analyzed by electronic gas analysis methods. Raw data from the electronic gas analyses were converted into oxygen-deficit, oxygen-debt, oxygen-discrepancy, and percentage of maximum oxygen uptake values by means of appropriate formulae. These values along with heart rate values, which were recorded via a telemetry system during the last minute of each exercise period, were examined over the three submaximal work loads. There were indications that lower levels of fitness and/or work capacity tended to result in larger oxygen-deficit, oxygen-debt, oxygen-discrepancy, heart rate, and percentage of maximum oxygen uptake values at submaximal work loads. A linear relationship was found between successive work loads of 450, 750, 1,050 kg-m/min and oxygen deficit, heart rate, and percentage of maximum oxygen uptake. Oxygen-debt and oxygen-discrepancy demonstrated curvilinear relationships with these same work loads. Oxygen-debt was larger than oxygen-deficit at a work load of 450 kg-m/min; the difference between these two variables (oxygen-discrepancy) increased with greater work loads.

Thomas P. Martin
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March 26, 1972
10:45 a.m.

THE ROLE OF MAXIMAL OXYGEN INTAKE AND DEBT IN PREDICTING RUNNING PERFORMANCE. Dr. Victor Katch, University of California, Santa Barbara.

The relationship between maximal debt capacity, aerobic power, and running performance were studied in 35 college males, mean age 21.4 yrs. The observed max debt averaged 4.89 liters net, max O_2 intake was 3.34 l/min, 100-yard sprint time was 12.4 sec, and the 2-mile time was 13.73 min with an estimated debt of 5.9 liters for the run. Substantial individual differences in the performance scores and oxygen measures were established by reliability coefficients. The correlation of 2-mile performance was r=.31 with max debt and .55 with $\dot{V}O_2$ max. The multiple correlation was .57 using debt and $\dot{V}O_2$ max; adding the body weight variable changed R to .58. For the 100-yard sprint, the correlation was -.01 with max debt and -.10 with $\dot{V}O_2$ max; the multiple correlation of .20 was not improved by adding body weight. Evidently effective prediction of individual differences in performance requires more than measured values of max debt and aerobic power ($\dot{V}O_2$ max). Psychological factors such as motivation and pain tolerance are probably important.

Dr. Victor Katch
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March 26, 1972

11:00 a.m.

OXYGEN INCOME AND DEBT PAYOFF DURING 1-MINUTE OF ALL-OUT EFFORT ON THE BICYCLE ERGOMETER. Robert N. Girandola, University of California, Riverside; Victor Katch, University of California, Santa Barbara.

To investigate the performance and metabolic (O_2 income and debt) alterations of performing 60 seconds of all-out work on the bicycle ergometer, 35 subjects performed 2,890 Kg-m of work (mean rpm was 85.0, with a constant resistance of 35 kp/rev). Analysis of the work performance curve revealed that the subjects were able to increase their rate of pedaling from an initial rate of 121 rpm in the first six seconds to 124 rpm at the end of twelve seconds. The downward trend in the performance for the average subject was 59.7 percent. Over one-half of this decrement occurred by 30 seconds. Extensive individual differences in performance was found. The downward trend in the within-test reliability approximated 70 percent. The r between total cumulated work and net debt was .33, while between income and work r = .57. The multiple R of .60 using both O_2 income and debt to predice work output suggested that factors other than O_2 account for the observed individual differences in work rate. The O_2 debt payoff from the work was shown to fit a theoretical two-component exponential curve, the curve parameters being of similar magnitude as reported by others.

Robert N. Girandola
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March 26, 1972
11:15 a.m.

AEROBIC CAPACITY, ENDURANCE RUNNING PERFORMANCE AND BODY COMPOSITION IN COLLEGE WOMEN. Frank I. Katch, Roman Czula, Gary S. Pechar and William D. McArdle, Queens College.

The relationship between aerobic capacity (max $\dot{V}O_2$), endurance running performance and body composition was determined in 36 college women. Max VO_2 was measured using the Balke treadmill test. Endurance running performance was evaluated by the Cooper 12-minute test, where the subject ran as fast as possible in 12 minutes. Per cent body fat and lean body weight were calculated from whole body density measurements using underwater weighing and residual volume techniques. Test-retest reliability for max $\dot{V}O_2$ (L/min) was r = .55), per cent body fat (r = .-.03), lean body weight (r = .76), and body weight (r = .66). The correlations with 12 minute run time were: per cent body fat (r = -.55), lean body weight (r = .49), and body weight (r = .04). When the correlation of r = .55 between max $\dot{V}O_2$ (L/min) and the running performance was corrected for attenuation from unreliability in the run and max $\dot{V}O_2$ scores, the correlation increased slightly to r = .60. Expressing max $\dot{V}O_2$ in ml-O_2/kg improved the correlations only slightly with the endurance run and body composition measurements. It was concluded that the validity of the Cooper 12 minute running performance, using max $\dot{V}O_2$ as the criterion of validity, was too low to be of much predictive usefulness as a test of "cardiovascular" fitness for the college women measured in this experiment. Per cent body fat, lean body weight and body weight did not seem to affect the distance a college woman could run in the Cooper 12-minute endurance run test.

Frank I. Katch
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March 26, 1972

11:30 a.m.

THE EFFECTS OF PHYSICAL TRAINING ON POST-CORONARY PATIENTS.

William J. Stone, Arizona State University.

The purpose of this investigation was to determine the effects of aerobic interval training on selected physiological and anthropometric measures on heart disease patients. Twenty-two men with documented heart disease were accepted into a physical fitness rehabilitation program on the recommendation of their personal physicians. Twelve subjects followed a three day-a-week exercise program for six months and ten subjects acted as controls. A preliminary ECG stress test was given by the personal cardiologist and a recommended maximum exercise heart rate was established. The daily exercise program included three elements: 1) warm-ups, consisting of slow stretching and rhythmic calisthenics; 2) aerobic interval training consisting of walking or walking and jogging, geared to the individual patient; and 3) a tapering off period of reduced activity. Pre and post test measurements were made on: resting heart rate, systolic and diastolic blood pressure, respiratory rate, vital capacity, weight, waist and chest measurement, skinfold (triceps), time for one mile, and exercise heart rate. A t-test of significance was used to compare the means on the pre and post test data for the exercise group and the controls. The exercise group decreased significantly ($P < .01$) in resting heart rate, systolic blood pressure, and time for the mile. Significant difference began to appear in these measurements as early as six weeks. The control group did not show any significant improvement, but rather decreased significantly in vital capacity. A training effect was observed as exercise heart rates for given loads decreased and the subjects increased their exercise capacity.

William J. Stone, Dept. of HPER
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March 26, 1972
11:45 a.m.

69

EFFECT OF ACHIEVEMENT MOTIVATION ON RISK TAKING CHOICES OF MEN AND WOMEN. Glyn C. Roberts, Department of Physical Education, Kent State University.

The effect of achievement motivation on risk tolerance levels for a complex motor task was determined. In addition, the differential response between men and women, and the interactions between sex and achievement motivation level, were also investigated. Ten male and 10 female achieve-success oriented Ss and 10 male and 10 female avoid-failure oriented Ss (selected from a pool of 101 men and 134 women by the Lynn Achievement Scale and the Text Anxiety Questionnaire) practiced a modified shuffleboard game. Ss shot discs into a target from eight distances. Practice phase data was used to generate empirical probabilities of success for each S. In the performance phase Ss were tested alone and given 20 free-choice trials. Risk-taking was based upon the S's choice of the empirically determined probabilities of success. Results showed that male and female achieve-success Ss chose intermediate risk tolerance to a significantly greater extent than male and female avoid-failure Ss. Avoid-failure Ss avoided intermediate risk and chose either extreme or conservative risk instead. No significant interactions resulted, but women achieve-success Ss were inclined to take more risk than men achieve-success Ss, while men avoid-failure Ss were inclined to take more risk than women avoid-failure Ss. Performance results showed that, contrary to prediction, avoid-failure Ss performed better than achieve-success Ss.

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March 26, 1972

10:45 a.m.

THE DISCRIMINATION POWER OF PSYCHO-PERCEPTUAL MOTOR, MOTOR COORDINATION AND PERSONALITY VARIABLES AMONG THREE DISCRETE INTELLECTUAL GROUPS. Lawrence K. Werner, Illinois State University; A. H. Ismail, Purdue University.

Fifty variables involving four domains of development, namely, psycho-perceptual motor, motor coordination, personality and intellectual performance were selected. The psycho-perceptual motor variables included tasks which attempted to measure abilities such as: perceptual motor speed, perceptual motor learning, visual temporal memory, visual spatial memory, auditory memory, rhythm discrimination, time discrimination, two and three dimentional spatial ability, and balance. Eleven motor coordination variables consisted of tasks requiring the subject to move his arms and legs to specified movement patterns. Thirteen personality variables were measured by Porter and Cattell's (CPQ-Form A). Six intellectual criteria were established using factor B of the (CPQ), the Culture Fair Intelligence Test, and three sub-tests from the Iowa Test of Basic Skills. The 259 subjects were selected based on sex, grade level, and intellectual performance. Three discrete intellectual groups (83 high group subjects, 96 middle, and 80 low) were then used to determine the discrimination power of the 44 non-intellectual variables. The purpose was to determine the relative importance of these variables in the discrimination and to determine the ability of the three domains of variables in classifying subjects into intellectual groups. For the analyses, 44 non-intellectual variables were utilized in multiple and two group discriminant function analyses, taking one domain of variables at a time. Furthermore, multiple and two group discriminant function analyses using combined sets of variables were performed in order to determine the ability of the combined sets of non-intellectual variables to discriminate among the three discrete groups. It was concluded that there are significant differences in psycho-perceptual motor, motor coordination and personality trait performance among the high, middle and low intellectual groups, with the high group performing best, followed by the middle and the low groups respectively. In addition, the combined subsets of the variables which were the "best" discriminators from each domain, were found to discriminate more powerfully among intellectual groups than any subset of the three domains independently.

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March 26, 1972
11:00 a.m.

ANXIETY LEVELS AND THEIR INFLUENCE ON DECISION MAKING TIME.
Jerome L. Kalamen, University of Denver; Gerald C. Wainwright, University of Denver.

Research points to the importance of recognizing anxiety as an influence in successful learning performance. However, research is lacking in terms of anxiety's effect on a task involving physical performance. It was the purpose of this study to measure the relationship between anxiety, as measured by the Taylor Manifest Anxiety Scale (MAS), and a specific variable of physical performance:

1. A comparison of response time and decision making time
2. A comparison of anxiety levels with response time
3. A comparison of anxiety levels with general decision making time.
4. A comparison of anxiety levels with three progressively difficult decision making time tasks involving movement.

The Taylor MAS was administered to forty-seven male students to determine normal anxiety levels. Decision making time was determined by the use of the Dekan Timer. Subjects were instructed to step on to one of three floor pads corresponding to the signal given on a 3-light box placed directly in front of them. Progression in difficulty was attained by changing the signal from a single light stimulus to a multi-light stimulus. Pearson product-moment correlations and rank order correlations were used to determine relationships.

1. Response time and decision making time have no relationship.
2. Anxiety levels have no relationship with response time.
3. Anxiety levels have no relationship with general decision making time.
4. Anxiety levels have no relationship with progressively difficult decision making tasks.
5. Three progressively difficult decision making tasks have a significant positive correlation at the .01 level with each other.

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March 26, 1972
11:15 a.m.

THE RELATION BETWEEN ANXIETY AND MOTOR PERFORMANCE IN YOUNG CHILDREN. Conrad Milne, University of Western Ontario.

The purpose of this study was to investigate whether the level of anxiety was related to the level of motor performance in young children. The sample of 100 boys and 100 girls each from kindergarten, grade one and grade two, N = 600, was randomly determined by proportional stratification by school in Battle Creek Michigan.

Each child was administered the Motor Performance Battery which included items for agility, power, flexibility, endurance and reaction time. Strength and static balance items, originally included, were excluded from the final statistical analysis due to truncation of the data.

Anxiety measures were obtained by the Palmar Sweat Test, the General Anxiety Scale for Children, the Test Anxiety Scale for Children and the Teacher Rating Scale. Kindergarten children were not administered the Test Anxiety Scale for Children as they had not yet encountered the "testing experience"

A multiple regression analysis was employed to estimate relationships between each dependent variable and a set of independent variables. The dependent variables were the motor performance items and the independent variables included the anxiety measures, sex and race.

The results of the present study suggest that a high level of anxiety has a detrimental effect upon motor performance of young children.

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March 26, 1972
11:30 a.m.

COLLIS SCALE OF ATHLETIC AGGRESSION. Dr. Martin L. Collis, University of Victoria.

Recent articles have appeared in both the popular and professional press questioning the role of athletics in promoting socially desirable behavior patterns. The Collis Scale of Athletic Aggression was devised and administered to check relationships between participation in specific sports and the tendency to seek success both inside and outside accepted sporting codes. The Collis Scale is made up of 50 questions each relating to a particular sport or sporting situation. For every question there are four possible responses which are rated from 1 to 4, with the highest number of points awarded to the most competitively aggressive response. The most aggressive response to half the questions involves transgressing the laws of a game, whereas in the remaining half, the most aggressive response involves legitimate dedication and personal sacrifice in order to achieve success. The final list of questions was determined after a factor analysis of questions used in pilot studies. Initially 4 sports were selected for analysis along with a control croup. The Collis Scale was administered to male participants in competitive programs in soccer, ice hockey, swimming and gymnastics. Within each sport the test was completed by 20 participants at each of 3 levels, (10 and under, 14 and under, and 18 and under). Analysis of covariance was applied to the results indicating that participation in a competitive age group program was related to general athletic aggression, and in the case of two sports, soccer and hockey, to extra-legal athletic aggression. The acquisition of a disregard for sporting laws was indicated by the increasing scores for extra-legal aggression among all the older age groups, but significantly so in hockey and soccer. If personal dedication is an athletic ideal, then this was most nearly obtained by the age group swimmers. Analysis of covariance was applied to the results. It should be noted that the publicity given to professional players in soccer and hockey could well be a factor in the developing attitudes of young players.

Dr. Martin L. Collis
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March 26, 1972

11:45 a.m.

THREE-DIMENSIONAL CINEMATOGRAPHIC DATA ANALYSIS BY COMPUTER[1]. Youngil Youm, University of Wisconsin, Madison; Elizabeth M. Roberts, University of Wisconsin, Madison; Anne E. Atwater, University of Arizona.

The purpose of the work was to describe mathematically the kinematics of body motion, or the motion of body parts, as observed in three dimensions on film, and to program the mathematical procedure for the computer. Data are read in three dimensions (X_n, Y_n, Z_n) from 2 simultaneous camera views of the performance. A third camera view has been used to assist depth correction. If the cameras are not electrically synchronized, position data are plotted on a continuous time base and curve fitted graphically. Synchronized position points are then read from the curves at specified intervals, e.g., .01 sec., and card punched for computer processing. In the program the input data for linear measures are multiplied by the appropriate depth correction factor(s) and curve fitted by the least squares method. A polynomial degree appropriate to the data is selected, and/or different degrees of polynomial are tried for goodness of fit, and the output points are compared to the input. The three component vectors of velocity and acceleration ($\dot{X}_n\vec{i}$, $\dot{Y}_n\vec{j}$, $\dot{Z}_n\vec{k}$, and $\ddot{X}_n\vec{i}$, $\ddot{Y}_n\vec{j}$, $\ddot{Z}_n\vec{k}$) are mathematically derived from the displacement equations for the three vector components of position ($X_n\vec{i}$, $Y_n\vec{j}$, $Z_n\vec{k}$). The magnitudes of the resultant position, velocity and acceleration vectors are then computed by taking the square root of the sum of the squares of each component. The program has been satisfactorily tested on the three-dimensional motion of the ball in the hand of a thrower. In addition, it has been generalized to one and two-dimensional computations and may thus be used for angular motion, and for linear motion in a plane. It can accommodate both equal and unequal intervals between data points.

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[1] Supported in part by the Research Committee of the Graduate School from funds provided by N. I. H. Biomedical Support Grants.

Youngil Youm
Dept. of Engineering Mechanics
University of Wisconsin
Madison, Wisconsin 53706

March 26, 1972

2:00 p.m.

COMPUTERIZED MODEL OF SUCCESSFUL SCORING SHOTS IN ICE HOCKEY.
Robert F. J. Cowan, Owen Sound, Ontario; H. H. Merrifield, Ithaca College.

This study was concerned with examining a number of variables which determine the trajectory of the ice hockey puck, to relate these variables to each other, and to determine the success of the shot within the goal cage. The specific objectives were: (1) to determine the minimum and maximum velocities of the puck for selected heights within the goal at various angles of projection and distances, (2) to determine minimum and maximum angles of projection of the puck for selected heights within the goal at various velocities and distances, (3) to determine the minimum and maximum distances from the goal for selected heights within the goal at various angles of projection and velocities. A computer program was written to calculate the range of a simulated ice hockey shot with the option of holding any two factors constant to study the effect of the third factor. The three factors considered were: angle of projection, velocity, and distance from the goal. The program indicated the success of the shot in regards to the goal cage which had been divided into acceptable and ideal upper and lower quadrants. A mathematical model was developed to calculate the range of the projectile. The equation programmed for the computer is as follows:

$$\text{Range} = \frac{\Delta s}{(\cos\theta)(V_\theta)}\left[(\sin\theta)(V_\theta)\right] - 16.0848\left[\frac{\Delta s}{(\cos\theta)(V_\theta)}\right]^2$$

Tables have been developed to indicate successful shots within the acceptable and ideal upper and lower quadrants at varying velocities, angles of projection, and distances from the goal. In addition, the time of flight of the puck was included. The findings of this study are: (1) the relationship between velocity of the ice hockey puck and distance from the cage is positive with scoring in the ideal lower quadrant at a small angle (2) with increasing angles of projection, decreased velocities and distances affords scoring in the upper ideal quadrant (3) if distance is held constant, the best angle of projection for success in either quadrant changes according to velocity.

H. H. Merrifield
Ithaca College
Ithaca, New York 14850

March 26, 1972
2:15 p.m.

76

BILATERAL ISOKINETIC FORCE MEASUREMENT OF THE QUADRICEPS AND HAMSTRING MUSCLE GROUPS AT CONTROLLED VELOCITIES.[1] H. H. Merrifield, Ithaca College.

The purpose of this study was to compare bilaterally, maximum isokinetic force for the hamstring and quadricep groups at six different revolutions per minute (R.P.M.), and to determine the force imbalance between the two muscle groups in relation to the speed of contraction. Fifteen female volunteers, not active in athletic competition, were instructed to exert maximum force in knee flexion and knee extension. The Cybex isokinetic system was used to measure the selections of the R.P.M., leg tested, and muscle group order were all randomly assigned. The subjects were tested for three different R.P.M. on each of two different days. Intraclass correlations calculated on five scores for all measurements ranged from .733 to .977. The "t" test was used to determine significance between the intralimb quadriceps and hamstring muscular force and the left and right quadricep and hamstring groups, respectively. It can be concluded that intralimb variability exists between quadriceps and hamstring maximum force at different R.P.M. A significant difference ($p < .05$) existed between the maximum force values for the quadriceps and hamstrings within the same thigh for all R.P.M. In comparing the left and right muscle groups, only the hamstring group at 4 R.P.M. was found to be significantly different ($p < .05$). The nondominant limb showed a continuous increase in mean percent difference of force imbalance between the hamstring and quadriceps maximum forces, whereas the dominant limb demonstrated an erratic pattern increasing at 8, 12, and 20 R.P.M. and that the patterns in mean percent difference in force imbalance was not significant. There was a significant difference in the mean percent difference between the mean percent differences at the various R.P.M.

[1]This investigation was conducted in the Physical Therapy Kinesiology laboratory with the assistance of John Garzione.

H. H. Merrifield, Ph.D.
Ithaca College
Ithaca, New York 14850

March 26, 1972

2:30 p.m.

COMPARATIVE MUSCLE ACTION POTENTIAL VALUES OF ISOMETRIC, ISOTONIC AND ISOKINETIC CONTRACTION. Joel Rosentswieg and Marilyn Hinson, Texas Woman's University.

The muscular tension produced by isometric, isotonic and isokinetic contractions was compared by integrated electromyographic techniques to test the hypothesis that the isokinetic method of contraction would produce the greatest MAP of the 3 methods studied. Data were collected on college women (N=52) who performed maximally under each contraction type. Procedures followed included using surface electrodes and the Newport Laboratories Bioelectric Monitor to obtain a digital readout as well as a typical EMG waveform. Data were reduced to voltage RMS/sec and were compared for a 5 sec isometric contraction, a full range of motion isotonic contraction to within 2.5 lbs of maximum and a full range of motion isokinetic contraction. Bicep Brachii flexion and Rectus Femoris extension were the movements measured. No single contraction type was found which produced the greatest muscular tension for all subjects. Strength gain due to a given exercise program would seem to vary with the individual and the motor unit involvement elicited by the type of contraction employed. The isokinetic technique appears to be the single most efficient method to develop strength for gross motor activities. EMG values for this method did not differ significantly from the one that produced the greatest muscle action potential in both movements measured and it does not require separate contractions at unique angles to produce tension maximally during the full range of motion.

Appreciation to the Mini Gym Corporation of Independence, Missouri, and to the Texas Woman's University for grants partially supporting this study is acknowledged.

Joel Rosentswieg
College of Health, Physical Education and Recreation
Texas Woman's University, Denton, Tx

March 26, 1972
2:45 p.m.

A STROBOSCOPIC PHOTOGRAPHIC STUDY OF MOTION CHANGES THAT ACCOMPANY MODIFICATIONS AND IMPROVEMENTS IN A THROWING PERFORMANCE. Joseph R. Vorro, Lincoln University.

It was the purpose of this study to identify and analyze the effects of practice on the movement changes of an upper limb while engaged in a novel ball throwing task for accuracy. Eight male university students served as subjects, and participated in a training program consisting of fifty throws per day at a target for twenty consecutive days. Information taken from stroboscopic photographs of the first and last days of the practice sessions served as the data for the study. Accounts made each day of the average deviation of the ball about the target center indicated a considerable reduction in throwing error. The motor modifications that accompanied this performance improvement included changes in rate (velocity magnitude) and changes in position (wrist angle). Post test velocity scores were reduced in value from their pre test counterparts. These post test velocities were also considerably more consistent. Initial post test accelerations were much lower than similar measurements made of the pre test throws. Subsequent post test deceleration in preparation for the ball release was more gradual and controlled than the pre test measurements. Post test acceleration rates were again more consistent than pre test accelerations. Finally, measurements of the degrees of ulnar-flexion for the post test far exceeded the pre test values. This was similarly accompanied by an increase in the consistency of its occurance. Through experimentation within the practice sessions, the subjects performed the needed alterations on the velocity and acceleration elements and the manipulation element. The alterations were successful to the extent that the reduced variance, reduced velocity, reduced acceleration, and increased wrist angle resulted in a lessening of the deviation of the ball from the target center.

Joseph R. Vorro
Department of Physical Education
Lincoln University
Lincoln University, Pa. 19352

March 26, 1972
3:00 p.m.

A CINEMATOGRAPHICAL ANALYSIS OF THE MODIFICATIONS OCCURRING DURING THE ACQUISITION OF A NOVEL THROWING TASK. David L. Kelley and Donald J. Hobart, University of Maryland.

The purpose of this study was to identify and analyze the kinematic modifications in performance that occurred during the acquisition of a novel throwing task. The task consisted of an underhand toss with the limb extended and fully pronated. A padded splint was attached to the cubital fossa surface of the limb and a small cup placed on the dorsal surface of the forearm at the level of the ulnar styloid process. A small sponge rubber ball was propelled to the target in a pendulum type throwing motion which consisted of shoulder flexion through approximately 60 degrees. Thirty-one subjects practiced the task for 150 trials during one sitting. A Bolex 16 mm camera operated at a film transport speed of 64 frames per second was used to gather the data during the first and last four trials. The data were reduced and analyzed statistically by a two-tailed paired t test. The analysis of the data revealed that after practice there was a significant: (1) reduction in throwing error, (2) decrease in the angle of the limb at release, (3) decrease in the total time of movement, (4) decrease in the elapsed time at the positions of 15, 35, and 45 degrees, (5) increase in the limb velocity at the positions of zero through 35 degrees, (6) increase in the velocity of the limb at ball release, and (7) increase in the acceleration at .064 seconds (approximately -2.00 degrees) of movement time and the zero degree position. It was concluded that during the acquisition of the skill investigated limb velocity and acceleration significantly increased particularly in the early phases of the movement, while movement time and the angle of the limb at ball release significantly decreased. These modifications contributed to improved performance.

David L. Kelley
Dept. of Physical Education
University of Maryland
College Park, Maryland 20742

March 26, 1972

3:15 p.m.

AN ELECTROMYOGRAPHIC ANALYSIS OF THE MODIFICATIONS OCCURRING DURING THE ACQUISITION OF A NOVEL THROWING TASK. Donald J. Hobart and David L. Kelley, University of Maryland.

The purpose of this study was to identify and analyze the modifications in performance that occurred during the acquisition of a novel throwing task. The task consisted of an underhand toss with the limb extended and fully pronated. A padded splint was attached to the cubital fossa surface of the limb and a small cup placed on the dorsal surface of the forearm at the level of the ulnar styloid process. A small sponge rubber ball was propelled to the target in a pendulum type throwing motion which consisted of shoulder flexion through approximately 60 degrees. Thirty-one subjects practiced the task for 150 trials during one sitting. Integrated electromyography and cinematography synchronized through the use of a specially constructed timer were employed to gather the data during the first and last four trials. Surface electrodes were used to monitor the electrical output of the clavicular head of the pectoralis major, anterior deltoid, posterior deltoid, and triceps brachii. The pre- and post-practice data were reduced by planimetry and analyzed statistically by a two-tailed paired t test. The analysis of the data revealed that after practice there was a significant: (1) decrease in the total electrical output of the anterior deltoid, (2) increase in the total electrical output of the posterior deltoid, and (3) no change in the electrical output of the pectoralis major and triceps brachii. It was concluded that during the acquisition of the skill investigated definite measurable changes occurred in the timing of muscle responses which resulted in an increase in the electrical output of the posterior deltoid and a decrease in the electrical output of the anterior deltoid. These modifications contributed to improved performance.

Donald J. Hobart
Dept. of Anat., Dental School
University of Maryland
Baltimore, Maryland 21201

March 26, 1972

3:30 p.m.

MUSCLE ACTIVITY IN REVERSIBLE ACTIONS: AN ELECTRO-MYOGRAPHIC ANALYSIS. Dr. David L. Blievernicht, Wayne State University.

Six potential elbow flexors of seven subjects were observed via surface electromyography in their role under conditions representing regular and reverse actions. The skilled movement of chinning was performed in regular fashion moving the body toward the hands and in reverse fashion moving the hands and cabled pulley weights equal to body weight toward the body. A single joint action, elbow flexion, was studied as a regular curl (arm fixed, forearm free to rotate) and an inverted curl (forearm fixed, arm free to rotate). Equated curling tasks of the regular and inverted form were used to study the effects of variations in load from maximum to 60% of maximum, and variations in tempo from 40 to 80 beats per minute. The regular curl was also performed with the bar only (no load) at 40 and 80 beats per minute to study possible spurt or shunt effects in muscle function.

Dr. David L. Blievernicht
Div. of Health and Physical Education
Wayne State University
Detroit, Michigan 48202

March 26, 1972

3:45 p.m.

EFFECT OF MUSCLE SPINDLE ACTIVITY IN ADJUSTMENT TO LOAD.

Alice L. O'Connell, Ph.D., Associate Professor of Biomechanics,
Boston University, Sargent College of Allied Health Professions

This paper presents a study of muscle spindle response occurring in the right biceps brachii during adjustment to changes in load supported by the right upper extremity. Electromyograms recorded from both heads of the right biceps brachii were synchronized with cinematography. Subjects were asked to flex the elbow 90° and to hold a flat basket in the right hand while a 2½ pound weight was: 1. dropped into the basket from a height of 3" to4"; 2. lowered slowly into the basket. Muscle spindle is set via cortically induced bias of gamma efferents to maintain the forearm and hand (holding the basket) at 90° flexion at the elbow. When the load is added abruptly as in #1 the forearm drops and the stretched spindle fires the primary afferents which in turn provide input stimuli to the motor neuron pool of the elbow flexors. This in turn results in an increase of the motor neuron output to bring the elbow flexors back to their pre-set length, i.e. a phasic response which removes the extraneous stretch imposed on the spindles. This activity is illustrated by the sudden burst of activity recorded in the Emg. When the load is added slowly as in #2 the activity of the biceps increases gradually to a new tonic level without any sudden burst, i.e. a statis response of the muscles concerned. In both cases, when the load is removed, the muscle activity returns to the original resting level necessary to maintain the pre-set bias of the spindle.

Alice L. O'Connell, Ph.D.
Boston University Sargent College
Boston, Mass. 02215

March 26, 1972
4:00 p.m.

SELECTED FACTORS INFLUENCING PERFORMANCE IN THE JAVELIN THROW.
Ronald Lee Witchey, California State College, Fullerton, California.

Cinematographic techniques were used in conjunction with the BMDO2R - Stepwise Regression - computer program to determine the relationship between the mean horizontal distance attained in the javelin throw and the following: the degree of body lean at the start of the power phase; the horizontal velocity of the right iliac crest during the power phase; the angle of the javelin at the moment of release; the difference between the angle of pull and the angle of the javelin at the moment of release; the angle of the left knee joint at the moment of release; and the angle of the elbow joint of the throwing arm at the start of the power phase. The thirty-two subjects studied were participants in the 1971 California Collegiate Athletic Association (CCAA), National Collegiate Athletic Association (NCAA) College Division and NCAA University Division Track and Field Championships. The findings suggested the following: that for Intermediate Throws there existed a slight trend toward a positive relationship of body lean and horizontal distance and a negative relationship for Advanced Throws and Beginning Throws in the javelin throw; that the horizontal velocity of the right iliac crest during the power phase was related positively to the more advanced thrower and was considered the most important factor influencing horizontal distance attained in the javelin throw; that there existed a trend toward an inverse relationship of the angle of the javelin at release and the horizontal distance attained and an inverse relationship for the degree of difference between the angle of pull and the angle of the javelin at release and the horizontal distance attained in the javelin throw; that when considering Intermediate Throws and Beginning Throws, to improve upon the horizontal distance of the javelin throw the thrower must execute extension of the left knee joint at the exact moment of release; and that when considering Advanced Throws and Intermediate Throws there existed a slight trend toward an inverse relationship of the angle of the right elbow joint and the horizontal distance attained in the javelin throw, but when considering Beginning Throws a trend toward a positive relationship existed.

Ronald Lee Witchey
Department of Physical Education
California State College
Fullerton, California 92631

March 26, 1972
8:15 p.m.

THE EFFECT OF HEIGHT ON THE RACING DIVE. Mary E. Kluth, Marylhurst College.

This study was designed to investigate the effects of four different starting block heights on the performance of the racing dive. At each height the following variables were analyzed: (1) angle of projection, (2) angle of entry, (3) body angle at entry, (4) projection speed of the body, (5) distance traveled in flight, (6) deceleration after entry, (7) flight time, and (8) time from take-off to 10 feet after entry. Eight girls between the ages of 13 and 16 who were competing in the National A.A.U. Championships (1971) were tested. Subjects performed five dives at each of the following heights: 21 inches, 27 inches, 30 inches, and 36 inches. Motion pictures were obtained for all racing dives for the purpose of film analysis. An oscillograph was also used in order to record data from a natograph and contact switches. An analysis of variance was used to compare variables between block heights. Body angle at entry was the only variable that significantly differed among the four block heights, and it was found to increase as block height increased. Spearman Rank Order correlations were calculated for 15 variables but significant correlations were not always obtained probably because of a wide range in individual responses at the four block heights. The results showed that although no single height was optimal for all subjects, either the 30-inch height or the 36-inch height was optimum for most subjects.

This study was submitted by Mary E. Kluth in partial fulfillment of the requirements for the degree of Master of Science in physical education under the direction of Dr. Marlene Adrian, Washington State University.

Mary E. Kluth
Department of Physical Education
Marylhurst College
Marylhurst, Oregon

March 26, 1972

4:30 p.m.

65

THE EFFECT OF PHYSICAL EXERTION ON DYNAMIC BALANCE. Thomas R. Burke, Hunter College.

The purpose of the study was to examine the effect of different levels of physical exertion, as measured by heart rate, on dynamic balance (DB). A Latin Square arrangement was used to assign the levels of exertion: rest, light (120 bpm), medium (140 bpm), heavy (160 bpm), and severe (180 bpm), to each of the 12 subjects (Ss). A modification of the Reynolds Balance Device (RBD) was used as the instrument to measure DB performance. Each S first rode the bicycle ergometer for seven minutes and then took six trials at one minute intervals on the RBD. A trial consisted of the elapsed time from the onset of the first stimulus light to the completed response of the fifth stimulus light. The fastest DB scores were achieved immediately after light and medium levels of exertion. Slower DB scores were achieved on trials two, three, and four after heavy and severe levels of exertion. Consequently, it seems that prior physical exertion at 120 bpm and 140 bpm tends to enhance the DB performance on the RBD. In contrast, prior exertion at 160 bpm and 180 bpm tends to induce slower DB scores up to five minutes after performance on the bicycle ergometer.

Thomas R. Burke
Dept. of Physical Education
Hunter College, N. Y., N. Y. 10021

March 26, 1972
4:45 p.m.

16

EFFECTS OF MOVEMENT EXPERIENCES ON THE ACCELERATION OF PIAGET'S CONSERVATION OF MASS CONCEPT*, Elizabeth A. Schnabl, Sam Houston State University.

The purpose of this study was to explore the effects of certain movement experiences on Piaget's concept of conservation of mass. In general, attempts to accelerate concept of conservation formation have been unsuccessful. Previous research utilizing practice of the test items and research utilizing word symbols used in this study have not caused acquisition of conservation. It was conjectured that changing the shape of one's own body mass would contribute to understanding the conservation of mass concept involving manipulation of the shape of other objects. Subjects were ten Sam Houston State University Kindergarten children who were members of a regularly scheduled perceptual-motor learning class. Subjects were selected on the basis of: (1) conservation level of variability of Piaget's Concept Assessment Kit Conservation Test, (2) score of zero on the specific concept of conservation of mass, and (3) demonstrated understanding of the terms narrow, wide, long, and short. Subjects were randomly assigned to experimental and control groups of equal size during the two-month experimental period. Locomotor and non-locomotor movement problems were explored by experimental and control groups, but the problems of the experimental group stressed movement of the body using the dimensions narrow, wide, long, and short. The study tested two hypotheses. (1) There would be a significant difference between the control and experimental groups in the conservation of mass concept formation as measured by that item of the Piaget Concept Assessment Kit Conservation Test. (2) There would be a significant difference between the control and experimental groups in the amount of gain in total score on the Piaget Concept Assessment Kit Conservation Test. The Cochran Q test was used to examine the significance of the first hypothesis. Using this statistic, $.025 < p < .05$, and thus the first hypothesis was accepted. The Mann-Whitney U test was used to examine the second hypothesis. Since $p = .05$, the second hypothesis was accepted. The results indicate it is possible to accelerate the conservation of mass concept and other concepts of conservation by certain movement experiences.

*This research was done in fulfillment of the requirements for an Honors Program Bachelor's degree during 1970-71 under the direction of Dr. Wilhelmina D. McFee, Sam Houston State University, Department of Health and Physical Education for Women.

Elizabeth A. Schnabl
Dept. of Physical Education
Sam Houston State University
Huntsville, Texas 77340

March 26, 1972
5:00 p.m.

WEIGHTLIFTING RECORDS. Ernst Jokl, M.D., Tom Lafontaine, Mike Burgener, Linn Stranek, University of Kentucky.

The purpose of the study is to evaluate scope and range of increases of record performances in weightlifting during the post-World War II period. Analyses of performance developments are available for track-and-field athletics, swimming and basketball, but not for performances in weightlifting. In as far as weightlifting performances depend primarily upon physical power, and in as far as contests in weightlifting are held separately for different body weight classes, it is possible to compute from top level performances strength in relation to body weight in great detail. The following procedure was adopted: Results of world championships and Olympic Games as well as world records established during the period under reference were tabulated. Percentage increases since 1948 of performance improvements were calculated and plotted. The growth curves fitted to the scatter diagrams thus obtained were described and interpreted. These are the principle results: (1) Performances in weightlifting have significantly improved since 1948. (2) Per kilogram body weight, weightlifters in the bantam-, feather-, and lightweight classes are notably stronger than weightlifters in the heavyweight classes. (3) Growth curves of record performances in weightlifting are currently beginning to enter their asymptotic deflection-phases, with the exception of those for the superheavyweight class in which increasingly heavy athletes continue to make their appearance. (4) Until 5 years ago the growth curve of the world record in the shot put ran parallel with the growth curves of weightlifting world records for the heavyweight classes. Since then, the latter but not the former have continued to improve. The present shot put world record was established by Matson in April, 1967 (71 ft., 5½ in. or 21.78 m.). Like all other athletic records, records in weightlifting approach finite levels. HUMAN POWER IS GREAT BUT LIMITED.

Ernst Jokl, M.D.
Dept. of Health, Phys.Ed.&Rec.
University of Kentucky
Lexington, Kentucky

March 26, 1972

5:15 p.m.

PRIOR EXERCISE AND CIRCULORESPIRATORY ENDURANCE. Kerry Stewart and Bernard Gutin, Teachers College, Columbia University; Steven Lewis, Stanford University.

This study was designed to determine the effect of various intensities of prior exercise (PE) on endurance performance. Twelve adult males performed a circulorespiratory endurance task on a bicycle ergometer 2 minutes after completing 10 minutes of exercise at each of 4 intensities of PE. The PE was adjusted to maintain heart rate (HR) at resting levels (no exercise), 110, 140, and 170 bpm. The criterion task required the subject to pedal against a resistance of 3 kg. at a starting rate of 68 rpm. As he tired and could not maintain the pace, he kept going as fast as possible. His score was the number of revolutions for each minute of the 10 minute task. Each subject completed all 4 treatments and the data were analyzed in an analysis of variance for a 4 x 10 factorial design utilizing the .05 level for rejection of null hypotheses. Multiple comparisons were made utilizing Duncan's Range Test. Performance following the PE at HR 170 was significantly worse than that following rest, 110, and 140 bpm. while the latter 3 treatments did not differ significantly. In all treatments there was a significant tendency for subjects to slow down from minute 1 - 6 and then to speed up from minute 8 - 10. The deterioration in performance following PE at 170 bpm. was attributed to lactate accumulation during the PE. The lack of significantly improved performance following PE at 110 and 140 bpm. would seem to weaken the hypothesis that increased local temperature will increase mechanical efficiency and improve endurance performance.

Bernard Gutin
Teachers College
Columbia University
New York, N.Y. 10027

March 27, 1972
9:00 a.m.

PHYSIOLOGICAL CHANGES FOLLOWED BY THREE DIFFERENT JOGGING PROGRAMS IN MIDDLE-AGED MEN. Ali Tooshi, Jersey City State College.

The purpose of this investigation was to compare the effects of 2-, 3-, and 4-mile jogging per day upon pulse rates (pre-exercise, exercise and post-exercise) and body composition in middle-aged men. Twenty-eight men between 36 and 55 years of age were divided into four groups on the basis of initial body weight. Groups I, II, and III exercised 2, 3, and 4 miles a day, respectively. Group IV served as a control group. The experimental groups exercised 3 days a week for a total of 16 weeks. The training program consisted of progressive continuous walking and jogging. The intensity of workout was set at 12 minutes per mile at the beginning of the program, and it was gradually increased to 8 minutes per mile by the end of ten weeks of the program. All groups were led by a leader with identical intensity. The bicycle ergometer test was administered to the subjects. Heart rate recordings were made on the electrocardiogram. The pulse rates were recorded at rest, during exercise, and during recovery. Fasting body weight and eight skinfold fat measures were obtained. A one-mile run test was given at the end of the fourth week. Analysis of covariance and Scheffe's method of group comparison were employed for treatment of data. Five per cent level of significance was adopted in this study. The results showed that 3- and 4-mile groups made significant reduction in pulse rates and fat measurement. All three experimental groups improved in one-mile run time. It was concluded that less than 3 miles jogging per day for three times a week does not produce any significant change in the cardiovascular system.

Ali Tooshi
Jersey City State College
Jersey City, New Jersey 07305

March 27, 1972
9:15 a.m.

THE PREDICTION OF MAXIMUM OXYGEN INTAKE FROM RECOVERY HEART RATES

Joseph P. Winnick, State University College at Brockport.

This study was designed to investigate the accuracy of predicting maximum oxygen intake (max. $\dot{V}O_2$) using the Astrand-Ryhming nomogram from exercise heart rates estimated from recovery heart rates. Fifty male college students, ranging in age from 17-28 and varying widely in aerobic capacity, volunteered to serve as subjects for the study. Each subject pedaled a Quinton bicycle ergometer for a period of six minutes at a load of 600 or 900 kpm/min. depending on a subjective estimate of his physical condition. During this period, exercise heart rates were taken manually and oxygen consumption was determined using a 120 liter Tissot gasometer. From these values, VO_2/ml/kg was estimated from the Astrand-Ryhming nomogram. During the first three minutes of recovery, heart rates were recorded for each fifteen second interval. A stepwise regression analysis was utilized to determine the order of recovery heart rates which made the greatest reduction in the error of predicting exercise heart rate. For the total group, the highest correlation, coefficient of .89, was found between exercise heart rate and heart rate recorded during the first recovery interval. A correlation coefficient of .92, and a standard error of $\pm$4.23 or 10% was found between max. VO_2/ml/kg predicted from determined and estimated heart rates.

Joseph P. Winnick
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State University College
Brockport, New York 14420

March 27, 1972
9:30 a.m.

S1

ISOMETRIC FATIGUE CURVES OF ELBOW FLEXORS AND EXTENSORS. Wayne H. Glenn, Oregon State University.

The main goals of this study were to determine if elbow extensors have the same isometric fatigue patterns as elbow flexors and to compare the fatigue curves of elbow flexors and extensors at three levels of strength. Forty-five subjects executed 30 trials of isometric elbow flexion and 30 trials of isometric elbow extension. Each trial consisted of maximum exertion followed by a short rest in ten second cycles. The subjects were ranked on the basis of the addition of the median flexion and extension scores and were divided into three groups of 15. The groups represented high, middle, and low levels of strength. The results suggested that: (a) a significant amount of fatigue occurred in both flexor and extensor muscle groups of all subjects tested; (b) a significant difference existed between the strength of elbow flexors and extensors in all the levels of strength; (c) the fatigue patterns for both flexors and extensors were similar in all three levels of strength; and (d) even though in absolute values the individuals in the three significantly different strength levels possessed disimilar elbow, flexor-extensor fatigue patterns, no significant difference was found in the types of fatigue patterns exhibited. However, a tendency for the low group to fatigue at a higher rate than either the middle or high groups was evident.

The author wishes to acknowledge the help of Dr. Donald E. Campbell, Department of Physical Education, Oregon State University.

Wayne H. Glenn
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Corvallis, Oregon 97331

March 27, 1972

9:45 a.m.

S2

THE NATURE OF FOREARM BLOOD FLOW AT REST, DURING AND FOLLOWING A SUSTAINED SUBMAXIMAL CONTRACTION. George T. Jessup, Texas A&M University.

Traditionally, investigations into the nature of muscular fatigue have been primarily limited to measures of muscular endurance, or length of performance. In most of these studies, the subjective aspect of endurance time has not been controlled. Recently, more objective techniques have related variables, other than strength, such as integrated electromyography and blood flow to muscular fatigue. Purpose. The purpose of this investigation was to study blood flow through the forearm at rest, during, and following muscular fatigue. The specific problem was to determine whether or not peak exercise blood flow is related to immediate post-exercise blood flow. Procedures. Resting heart rate; resting blood flow; maximal voluntary contraction; maximal endurance time (at 30% MVC): minute exercise, immediate post-exercise, and minute recovery blood flows were recorded on each of thirty volunteer male college students at the University of Southern California during the Spring semester 1971. Grip strength and endurance was assessed with a specially constructed dynamometer consisting of an electronic strain gauge connected to a standard grip dynamometer with the load spring removed. Forearm blood flow measurements were made with a standard capacitance plethysmograph, using a specially constructed calibration cuff. The relationship between peak exercise blood flow and immediate post-exercise blood flow was calculated by the Pearson Product Moment Correlation Coefficient, with other correlations being reported. Results. The correlation coefficient between MVC and MET was $r = -0.43$, the correlation between peak exercise BLDF and immediate post-exercise BLDF was $r = 0.90$, while that between peak exercise BLDF and final exercise BLDF was $r = 0.88$. The correlations between MET and various blood flow measurements yielded very low values, the highest being that between MET and first-minute exercise BLDF of $r = 0.22$. Conclusion. Immediate post-exercise blood flow is highly related to peak exercise blood flow through the forearm during a sustained handgrip at 30 per cent MVC.

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March 27, 1972

10:00 a.m.

THE EFFECT OF WATER IMMERSION AT VARYING TEMPERATURES UPON MUSCULAR FATIGUE AND RECOVERY OF THE FOREARM FLEXOR MUSCLES. E. L. Bundschuh, University of Georgia.

The effects of 10 degrees, 14 degrees, 18 degrees, 22 degrees, 26 degrees, and 34 degrees centigrade temperature were studied on selected strength, fatigue and recovery parameters for dynamic exercise involving the performance of maximum voluntary muscular contractions. Specifically, the exercise variables of initial strength, final strength, fatigable work, total work, and rate of fatigue as well as total work and rate of recovery were investigated for the forearm flexors. In addition, the effects of the treatment conditions on forearm skin temperature, before, during and following the period of exercise, were examined. Thirty-one male university students were randomly tested on six separate occasions encompassing all treatments involving continuous immersion of the hand and forearm for an initial ten-minute period, a six-minute exercise bout, and a ten-minute recovery period. The exercise required maximal rhythmic contractions given at the rate of thirty per minute, while the recovery period employed single contractions at intervals of one minute. All measures including skin temperature were permanently recorded in continuous graphic form. Initial and final strength were unaffected by the environmental conditions investigated, while total work at the lowest temperatures of 14 degrees and 10 degrees centigrade was significantly improved over the three highest temperatures of 22 degrees, 26 degrees, and 34 degrees centigrade. The 14-degree centigrade condition caused significantly greater fatigable work than the three warmest temperatures investigated; however, the 10-degree condition differed only from the 26-degree temperature in this variable. Colder temperatures also caused slower fatigue rates. No significant differences occurred in the total recovery as a function of temperature. Skin temperature, except for 34 degrees centigrade (control), declined continuously throughout the entire ten minutes of resting exposure, and declined further during exercise at all treatments conditions. This decrease appeared to reach its lowest level by the second minute, with subsequent measures demonstrating a steady rise that continued through the remaining portion of the exercise period. Skin temperature rapidly increased within the first two minutes of recovery and then began a gradual decline through the remaining portion of this phase. It was concluded that the lowering of local environmental temperature had no effect on strength and recovery but did enhance those parameters indicative of endurance performance.

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March 27, 1972
10:15 a.m.

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THE EFFECTS OF COLD SHOWERS ON THE PERFORMANCE OF HIGHLY TRAINED RUNNERS. Ernest Michael, David Barni, Barry Foose, University of California, Santa Barbara.

Ten male subjects in training for endurance running repeated two 60 per cent and two 90 per cent maximal effort runs on a treadmill; one time with and another without a five minute cold shower between runs. The cold shower had no significant effect on the energy cost, oxygen debt or rates of recovery of the ventilation and oxygen uptake. Only the heart rate for the 60 per cent effort with the shower resulted in lower heart rate levels during exercise and recovery. It is suggested that the skin temperature or body heat content affects the response of the heart rate to cold but that the energetics of running or the efficiency are not affected by cold showers.

Dr. Ernest Michael
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March 27, 1972

10:30 a.m.

15

THE EFFECTS OF SLEEP DEPRIVATION ON DYNAMIC STRENGTH AND STAMINA

Robert W. Stauffer, United States Military Academy; Richard A. Berger, Temple University.

The purpose of this study was to determine the effects of thirty-four and fifty-eight hours of sleep deprivation on dynamic strength and stamina; and to identify motivational factors discriminating between individuals having a high or low performance decrement after fifty-eight hours of sleep deprivation. Three physical performance tests and a motivational test were given to seventeen male undergraduate students ranging in age from seventeen to twenty-three. The Pull-up and Dip Tests were used to measure dynamic strength, while the 600 Yard Run Test was used to measure stamina. Each subject was tested on the three performance tests on four different occasions; twice under the sleep deprivation condition at both thirty-four and fifty-eight hours; and twice under the normal sleep condition. The Motivational Analysis Test was used to measure motivational factors. The results indicated that only stamina was significantly reduced by thirty-four and fifty-eight hours of sleep deprivation. Differences in performance decrement between individuals, after fifty-eight hours of sleep deprivation, on the basis of dynamic strength and stamina, were not discernible by motivational factors.

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March 27, 1972
10:45 a.m.

THE COMPARATIVE EFFECTIVENESS OF TWO SELECTED METHODS OF PROGRESSIVE RESISTANCE EXERCISES DESIGNED TO IMPROVE KNEE JOINT STABILITY. Charley Wade Sparks, Texas A&M University.

Purpose. This study was to determine the most effective rehabilitative apparatus and exercises for subjects who had undergone knee surgery and for those subjects who had sustained knee injury but had no surgery. Procedure. The investigation used sixty male undergraduate students enrolled in the Required Physical Education Program at Texas A&M University as subjects for the experiment. The subjects were divided into two groups: (1) Those who had knee injury and had corrective surgery and (2) Those who had sustained knee injury but who had not had surgery. Each of these groups was divided into three subgroups. These groups were: (1) Elgin Exercise Group, (2) Single Boot Group, and (3) Control Group. The Elgin Exercise Group and Single Boot Groups did three sets of ten repetitions each of the prescribed exercises. The Control Group did not engage in any type of rehabilitative exercise program. Pre- and post-test leg strength measurements were taken at the following degrees or angles: knees at 90, 125, 135, and 175 degrees extension and knees at 20 degrees flexion. Pre- and post-test leg circumference measurements were taken at the following specific points: mid-calf, juncture of the quadricep muscle, mid-thigh, and at the fold line of the buttock. Conclusions. The following conclusions have been drawn from the analysis of the data: (1) With surgery and with no surgery, the Elgin Exercise Unit and Single Boot Methods were significantly better than the Control Group in developing leg strength at the various angles tested. (2) With surgery and with no surgery, the Elgin Exercise Unit and Single Boot Methods were significantly better than the Control Group in developing leg circumference at the various measured points.

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March 27, 1972

11:00 a.m.

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EFFECTS OF TWO WEIGHT TRAINING PROGRAMS ON STRENGTH INCREMENT.
Norman L. Redding, David A. Kaufmann, University of Florida.

It was the purpose of this study to compare the magnitude of strength increments resulting from two weight training programs. Using identical exercises, one system employed two sets of five repetitions with lighter weights for each exercise; the other program utilized five sets of two repetitions, with heavier weights. The weight training programs lasted for seven weeks with two workouts per week. Forty-three men were used in this study. They were acquired from two Winter Quarter weight training classes in the Department of Men's Physical Education, College of Physical Education, Health, and Recreation, at the University of Florida. Both classes were given pre- and post-tests for strength. The test consisted of a strength battery with four separate tests. Analysis of Covariance was used to determine the statistical significance of the observed mean difference in strength increment under the two programs. There was no significant difference ($P > .05$) in the mean strength gain between the two weight training programs. It may be concluded that in this study there was no significant difference in the strength increment produced by weight training programs consisting of two sets of five repetitions, or five sets of two repetitions over a seven week period with two workouts per week.

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March 27, 1972

11:15 a.m.

PRE-MOTOR AND MOTOR REACTION TIME DIFFERENCES ASSOCIATED WITH INCREASED STRENGTH. D. Laine Santa Maria and Thomas J. Nawrocki, University of Maryland.

The purpose of this investigation was to determine the effects of an increase in knee extension strength on the pre-motor and motor components of reaction time (RT). Thirty-one junior high school boys served as subjects. An experimental group of 16 subjects participated in a 6-week strength training program designed to increase knee extension strength and the remaining 15 subjects served as a control group. Pre and post treatment tests were administered to both groups to determine changes, if any, in strength; pre-motor; and motor RT. Knee extension strength was measured using cable-tension methods established by Clarke. DeLorme's strength training methods were used in the treatment program. Pre-motor and motor RT were measured using a light stimulus and a knee extension task. Mean differences between the experimental and control group for each pre-treatment test were not significant. Significant mean post treatment differences ($p = .05$) were obtained for knee extension strength, pre-motor RT, and total RT with the experimental group having the higher mean strength and the shorter mean pre-motor and total RT. The post treatment mean difference for motor RT was not significant.

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March 27, 1972
11:30 a.m.

EFFECTS OF EXERCISE AND AN APPETITE SUPPRESSANT ON OVERWEIGHT COLLEGE WOMEN. Paul Brynteson, Glenn Robinson, and JoAnn Krause, South Dakota State University.

The purpose of this study was to investigate the effects of a progressive exercise program of jogging, an appetite suppressant tablet to reduce the appetite drive, and a combination of both on selected anthropometric measurements and cardiorespiratory efficiency. Forty-four female volunteer students from South Dakota State University who had at least 25% body fat served as subjects for the study. A 2x2 factorial experimental design was followed. The subjects were divided into 4 equated groups on the basis of their percent body fat at the time of the initial test. One group exercised and took a 75 mg. tablet of Tenuate Dospan, a second group exercised and took a placebo, another did not exercise and took a 75 mg. tablet of Tenuate Dospan, and the last group did not exercise and took a placebo. The experimental period lasted for eight weeks. The suppressant and placebo were administered daily and the jogging was done 4 days per week. Subjects initially covered a distance of 1 mile in 13 to 14 minutes and progressed in both distance and time until a distance of 2 miles was jogged in 17 to 22 minutes by the end of 8 weeks. The subjects were tested initially, after 3 weeks, and at the completion of the experimental period. Subjects were measured for weight, 4 girth measurements, percent body fat, and cardiorespiratory efficiency as determined by the Astrand Predicted maximal oxygen uptake test. The results revealed the suppressant groups had significantly greater weight reduction and thigh circumference loss than the placebo groups. The jogging groups did not differ significantly in the anthopometric measurements from the nonjoggers. The jogging groups did, however, make significant greater gains in cardiovascular efficiency.

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March 27, 1972

11:45 a.m.

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THE RELATIVE EFFECTIVENESS OF MOTOR, INTELLECTUAL, AND PERSONALITY DOMAINS IN PREDICTING PEER GROUP STATUS. Don R. Kirkendall, University of Kentucky; Joseph J. Gruber, University of Kentucky.

Data were collected on 30 variables representing five domains of development from ninety-one culturally deprived low achieving high school pupils with high intelligence. Multiple correlation analyses were performed in an effort to determine if peer group status could be predicted by individual domains of fitness, coordination, intellectual and personality; and to determine which of these domains or combinations of domains has the greatest predictive power. An analysis of the data indicated that 13 of the 15 various combinations of domains were significantly related to peer group status with the multiple correlations ranging from .747 to .432. There was a significant reduction in predicting peer status when the coordination and fitness domains were eliminated from the total scheme. The reduction approached significance when eliminating personality and intellectual items. The multiple correlations between peer group status and the individual domains of personality and coordination were significant and of the same magnitude. However, peer status can probably be predicted more efficiently from the six item coordination domain as compared with the 14 item personality domain. In contrast the multiple correlations between peer acceptance and the fitness and intellectual domains treated separately were non-significant. In summary, the coordination and personality domains were the two most important in the prediction scheme; whereas the fitness and intellectual items were relatively unimportant.

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March 27, 1972
9:00 a.m.

PREFERENCES FOR HANDBALL DOUBLES PARTNERS IN COMPETITIVE AND COOPERATIVE 'ATMOSPHERES' - Merrill J. Melnick, State University College at Brockport; Ray R. Canning, University of Utah.

The purpose of this quasi-experimental study was to determine what happens when the drive to win through competition is neutralized through environmental manipulation. It was hypothesized that handball players placed in a highly competitive environment would prefer higher skilled doubles partners. Conversely, handball players placed in an environment in which competition was "played down" would prefer lesser skilled partners. Highly competitive and cooperative social atmospheres were contrived by the researchers and assigned by chance to students enrolled in two beginning college handball classes. The competitive class was exposed to a variety of competitive stimuli while the cooperative class emphasized learning for the good of all, having fun and helping each other. The competitive class was composed of 3, 4-man groups; the cooperative class consisted of 3, 4-man groups. One of the researchers provided the instruction and leadership for both classes. Following 4 weeks of practice, the Ss in each of the groups played singles and doubles on alternate days and were required to indicate their preferences for doubles partners in advance of the day on which doubles play was held. In spite of their choices, doubles partner assignments were rotated so that every S played doubles twice with each of the 3 members of his group. The first day of doubles play was preceded by 3 consecutive days of singles play in order to determine ability ranks. The results of the preference data for the players in the competitive atmosphere showed that the first ranked player chose the second best player 88% of the time and that the 2nd, 3rd, and 4th ranked players similarly "chose up" in their preferences. The choices made by the players in the cooperative atmosphere were almost totally random. Interestingly, the 2 poorest players in each of the foursomes under both of the conditions tended not to choose player 1. The results of a post-tournament questionnaire indicated that the modal choice for the poorest players (3rd and 4th ranked) was the 2nd best player because of his personality characteristics and supportive interactions. This was more often true for the poorest players in the cooperative atmosphere. Although simple in design, the results of this study do throw some light upon a few of the dilemmas that members of competitive cultures face who simultaneously seek other personal satisfactions.

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March 27, 1972

9:15 a.m.

THE RELATIONSHIP BETWEEN PARTICIPATION IN SPORTS AND THE MORAL AND POLITICAL SOCIALIZATION OF HIGH SCHOOL YOUTH IN CHILE.

Barry E. Stern, Oberlin College.

This investigation attempted to determine how, and to what extent, participation in sports is a possible source of social and political learning. Six types of socialization outcomes were used: (1) confidence in the incumbents of political roles; (2) willingness to utilize legal means to achieve social and political change; (3) political tolerance; (4) maturity of moral judgment; (5) social trust; and (6) school efficacy. The independent variable was represented by two highly related sports participation measures: (1) a sports orientation index, and (2) a participation on popular sports teams index, as well as by a number of psychological and contextual sports factors. A cluster sample of 1,500 male high school students in Santiago was administered a questionnaire designed to measure both the sports participation and political socialization variables, as well as to gather information on background and related factors. In addition, in order to measure maturity of moral judgment, an in-depth interview was developed and administered to a randomly drawn subsample of 76 students. Half of the students surveyed were in their first year of high school studies, while the others were in the third year. Bivariate and multivariate statistical procedures were employed to determine the relationships among and between the predictor and dependent variables. The principle findings were as follows: (1) Sports orientation, was positively associated with willingness to utilize legal means to achieve change. (2) Participation on popular sports teams was positively associated with confidence in the incumbents of political roles. (3) Among third-year private school students, participation on popular sports teams was positively associated with social trust and with feelings of personal efficacy within the school. (4) Participation in sports was not significantly related to political tolerance nor to maturity of moral judgment. In conclusion, participation in sports appears to be associated with a general acceptance of the society's authority structure. This "establishment orientation" is suggested by the rather consistent pattern of positive relationships which emerged between sports participation and those variables having to do with perceptions of authority figures and with the acceptance of rules in both sports and civic contexts. Although these relationships are weak, their overall configuration tends to confirm the notion that sport joins youth to the adult social order in its function as an agency of official social control.

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March 27, 1972
9:30 a.m.

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INTERPERSONAL ATTRACTION AND TASK DIFFICULTY EFFECTS ON THE MOTOR PERFORMANCE OF COACTING GROUPS. Daniel M. Landers, State University College at Brockport; Rainer Martens, University of Illinois at Champaign Urbana.

This study determined the effect of interpersonal attraction among coacting peers (reciprocally liked, disliked and neutrally evaluated) performing a complex motor task under low and high difficulty conditions. According to Zajonc's social facilitation theory, the arousal created by coactors hinder performance when the wrong responses are dominant. Hartup suggests that the arousal created by negatively evaluated peers facilitates learning of simple motor tasks, but may hinder the learning of more difficult tasks. To test this notion 72 junior high school boys were combined into dyads on the basis of their previously determined reciprocal friendship ratings and teachers verification of friendship ratings. For each of the three interpersonal attraction groups, 6 dyads were randomly assigned to low- and high-task difficulty conditions. A 3 X 2 X 8 factorial design was used with the last factor constituting eight blocks of two-minute trials. The task consisted of a modified, commercially sold roll-up game in which subjects attempted to roll a metal ball upward along two metal rods. Task difficulty was manipulated by raising and lowering the far end of the roll-up game to alter the degree of incline of the metal rods. Heart rates were taken to verify if the autonomic arousal conditions necessary for testing the hypothesis, were created. The heart rate results showed a tendency for arousal differences between interpersonal attraction and task difficulty factors. Significant performance differences were found for task difficulty and block-of-trials and their interaction. The interpersonal attraction factor, however, was not significant alone or in interaction and therefore, the hypothesis of this study was not supported.

This project was supported by a Faculty Fellowship to the senior author and Grant-in-Aid from the Joint Awards Council/ University Awards Committee of the Research Foundation of the State University of New York.

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March 27, 1972
9:45 a.m.

EFFECTS OF SOCIAL REINFORCEMENT, SUBJECT SEX AND EXPERIMENTER SEX ON CHILDREN'S MOTOR PERFORMANCE.

Donna M. Harney, State University College at Brockport;
Rosanne Parker, State University College at Brockport, New York

Social Reinforcement (SR) has been defined by social psychologists as positive or negative evaluation of an individual's performance through visual and verbal cues in the form of smiles and frowns, praise and reproof. As a continuation of SR studies investigating qualitative motor performance, the present study determined the effects of SR and experimenter sex on the qualitative motor performance of male and female primary school children. First, it is hypothesized that with positive SR subjects perform better with an experimenter of the opposite sex. Second, with the use of more frequent and arousing SR manipulations than were used in earlier studies utilizing qualitative motor tasks, it was predicted that SR would effect children's qualitative motor performance. The randomly selected subjects were 48 boys and 48 girls ranging in age from six to seven years. This study employed a 2 X 2 X 3 factorial design; the first two levels the sex of the subjects, and the sex of the experimenter, and the last the positive, negative and conversation-control SR treatments. The motor task used included 40 trials of rolling a ball up a six-foot inclined board to a target area in the center. Heart rate was recorded in order to provide support for the hypothesis that the SR used in the present study was arousing and stressful situation. Results indicated that male subjects in the negative SR and positive SR treatments performed significantly better than males in the conversation-control conditions.

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March 27, 1972

10:00 a.m.

EVALUATION POTENTIAL AS A DETERMINANT OF COACTION EFFECTS.[1]

Rainer Martens, University of Illinois; Daniel M. Landers, State University of New York at Brockport.

Two purposes of the study were: (a) to test the hypothesis that increasing numbers of coactors result in increasing impairment in motor performance; and (b) to determine what component(s) of the coaction situation produce the social facilitation phenomenon. Alone, dyads, triads, and quadrads were the four coactor levels. Evaluation potential was the second factor in which three treatments were created: the normal coaction situation (direct evaluation), the removal of visual cues but knowledge of others' performance outcome was possible (indirect evaluation), and no potential for evaluation (no evaluation). A 3 X 4 X 10 factorial design was used with 10 blocks of five trials each being the third repeated measure factor. 24 subjects were used in the collapsed alone condition and 12 subjects were used in each of the other cells. Results supported the hypothesis that increasing numbers of coactors results in increasing impairment in motor performance. Results also showed that coaction effects did not occur when evaluation was not possible, but partially impaired motor performance for quadrads in the indirect evaluation treatment. The results suggest that the form of evaluation possible is a determinant of coaction effects for motor performance.

[1]This investigation was supported in part by a research grant to the Motor Performance & Play Research Laboratory via the Adler Zone Center by the Department of Mental Health of the State of Illinois.

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March 27, 1972
10:15 a.m.

PRE AND POST-SEASON MOTIVATIONS OF COLLEGIATE WOMEN GYMNASTS.
Pearl Berlin, University of North Carolina at Greensboro.

The major purpose of this study was to ascertain differences between pre and post-season responses to an eighty item motivation Q-sort of women gymnasts who comprised two collegiate gymnastic teams. The teams were selected because of their general similarity in talent and competitive schedule, their close regional proximity, and their traditional rivalry. Both purportedly represent well-established and well-coached organizations. Sort scores were first obtained after squad cuts had been made but prior to the first match of the season for each team. Second responses were procured after the national intercollegiate tournament. The study spanned the 1970-1971 gymnastic season. Numerical values assigned to the statements were compared in relation to four broad motive categories: (1) contribution to self-regard, (2) the enabling of expression, (3) opportunity for social interaction, and (4) response to the challenge to be masterful. No statistically significant differences were found between pre and post season sorts. The two squads were compared in need to achieve as determined by the Lynn Achievement Motivation Questionnaire. Selected background factors for both groups were reviewed in relation to similar factors pertaining to women athletes who participate in other sports. The study is regarded as one small portion of a larger research undertaking, namely, the development of a theoretical explanation of women's motives to engage in high-level competitive athletic events.

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March 27, 1972
10:30 a.m.

AN ANALYSIS OF THE PERSONAL CONSTRUCTS OF A BEGINNING KARATE-KA USING THE REPORTORY GRID. Harold A. Lerch, University of Florida.

This study identified the personal construct system of a twenty year old male beginning karate student at the University of Florida and evaluated significant changes in his construct relationships after karate instruction using the Repertory Grid. The rationale for identifying personal constructs was based upon George Kelly's Theory of Personal Constructs. The Monaghan version of the Repertory Grid, which is an adapted and expanded form of the Bannister-Fransella Grid, was then used to observe the subject's construct relationships. The Grid is a projective instrument which investigates one's personal-social behavior. Before karate instruction, the subject's constructs were elicited through personal interview and observed by utilizing the Grid. This was termed, PRE-GRID. The subject then participated in karate class with fifteen other students three times a week for ten weeks. Each class session lasted for two hours. After ten weeks of instruction the subject's constructs, which were elicited before instruction took place, were again observed for changes in relationship using the Grid. This was termed, POST-GRID. A case study was then presented considering the subject's personal construct system in relation to karate participation. This was based upon the pre-instruction interview with the Grid and the post Grid. The following observations are reported as significant changes in the subject within the time period involved: 1) The subject experienced an increased sense of confidence in being able to physically defend himself; 2) He felt a desirable degree of recognition by participating in what he termed, "A red-blooded sport"; 3) His identity with what he considered to be a masculine sport challenged him to become "mentally purged" during workouts which, once completed, fostered a sense of relaxation; 4) The type of activity and atmosphere of the training room enabled him to leave his personal problems outside the training room. This was due, in part, to a feeling of beginning skill master; 5) An initial appreciation for the aesthetics of karate dropped sharply after ten weeks of instruction. The rigorous training re-altered his concept of this in favor of stronger feelings toward karate's usefulness as a measure of security; 6) The subject's self-concept and ideal self-concept became more closely aligned, as measured by the Repertory Grid. This case study emphasized the unique and complex response of an individual engaged in an activity. Understanding the learner from his personal-social frame of reference enhances the possibility of gaining further sensitivity into his behavior patterns and needs.

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March 27, 1972
10:45 a.m.

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SINGLE-YEAR AND LONGITUDINAL COMPARISONS OF PERSONALITY, INTELLIGENCE, AND ACADEMIC ACHIEVEMENT CHARACTERISTICS OF SENIOR HIGH SCHOOL ATHLETES AND NONPARTICIPANTS. John M. Pearson, Central Washington State College.

Three hundred twenty-eight boys in the 10th grade, 313 11th grade boys, and 240 12th grade boys were classified as being an athlete, a nonparticipating athlete (NPA) (an athlete in at least one other sport), or a nonparticipant (NP) in football, basketball, baseball, track, or wrestling. The longitudinal analyses included 193 12th grade athletes and nonparticipants. The following measures were used: personality - CPI, MHA, and selected check list adjectives; intelligence - CTMM; and academic achievement - grade point averages, ITED, and DAT. ANOVA with the Scheffé S Test and chi square statistical treatments were used for the single-year comparisons; ANCOVA was used for the longitudinal analyses; $p < .05$ was used in all comparisons. Single-year conclusions indicated that: (1) Football players were superior to NPs on four personality traits and twelve academic achievement measures; to NPAs on one personality trait and five academic achievement measures. Football players and NPAs each had two significant self-concepts. (2) NPAs were superior to basketball players on one personality trait and to NPs on two personality traits and one academic achievement measure. Basketball players were superior to NPAs on one academic achievement measure and to NPs on ten academic achievement measures. Basketball players and NPs each had one significant self-concept. (3) Baseball players were superior to NPs on six academic achievement measures; NPs were superior on three of these same measures. NPAs were superior to NPs on two personality traits and five academic achievement measures, and, also, to baseball players on four academic achievement measures. Baseball players and NPAs each had one significant self-concept. (4) Track athletes were superior to NPAs on two personality traits and two academic achievement measures. NPAs were superior to NPs on three personality traits and nine academic achievement measures. Track athletes had three significant self-concepts; NPAs and NPs each had one significant self-concept. (5) NPAs (wrestling) were superior to NPs on three personality traits and fourteen academic achievement measures and to wrestling athletes on one personality trait and one academic achievement measure. Wrestling athletes had five significant self-concepts; NPAs had three significant self-concepts. In the longitudinal comparisons, athletes showed greater mean gains than did NPs on nine personality traits and three academic achievement measures.

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March 27, 1972
11:00 a.m.

PERSONALITY CHARACTERISTICS OF GROUPS IN PHYSICAL EDUCATION AND RELATED PROFESSIONAL AREAS. Polly Cabe Roberts, Brenau College.

This study explored the personality characteristics of professional personnal in health education, physical education, and recreation by determining the personality profiles of groups of people in these and related fields. An attempt was made to determine: (1) if there were significant differences between the personality characteristics of the groups in this study and appropriate normative groups of the general population, and (2) if the personality characteristics of the groups in this study were significantly different from one another. A 10 percent random sample was drawn from the roster of AAHPER. The Sixteen Personality Factor Questionnaire and a personal data form were mailed to each member of the sample. Personality profiles of identifiable groups were established by the results of the 16PF and studied by sten score and univariate two-tailed "t" test comparisons. Comparisons of groups within the sample were made by a multivariate analysis of variance. The women in this sample from AAHPER as a total group and the women physical educators and administrators as separate groups were more reserved and aloof (A), intelligent (B), confident and placid (O), and experimenting and analytical (Q_1) than women of the general population. The women as a total group and those in physical education as a group were also more assertive and dominant (E), conscientious and persistent (G), tough-minded and realistic (I), controlled and exacting (Q_3), and composed and relaxed (Q_4). In comparison to males of the general population, the men as a total group and the male physical educators and administrators as separate groups were more intelligent (B), conscientious and persistent (G), and controlled and exacting (Q_3). The men as a total sample and the male physical educators were also more trusting and adaptable (L) and more naive and unpretentious (N). The men of the total sample, in addition, were more emotionally stable (C), tenderminded and sensitive (I), and more confident and placid (O).

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March 27, 1972
11:15 a.m.

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UNIVARIATE AND MULTIVARIATE APPROACHES IN STUDYING THE EFFECT OF CHRONIC EXERCISE ON THE PERSONALITY OF MIDDLE-AGED MEN.

R. John Young & A. H. Ismail, Purdue University.

The purpose of the study was to compare univariate and multivariate results in identifying the best personality factors for differentiating between two extreme physical fitness groups prior to and at the conclusion of a four-month physical fitness program. Two groups of middle-aged men (n=14) representing high and low fitness levels completed Cattell's 16 P.F. Questionnaire. The personality sten scores of the high and low fitness groups were compared initially and finally using two approaches, namely the univariate t-test and the multivariate discriminant function analysis. The univariate analysis revealed that Factors M and C were significant initially and Factors O, Q_2 and M finally. The multivariate analysis demonstrated the order of discrimination power of Factors C, M, O and Q_2 both initially and finally. It was concluded that in light of more information from the multivariate approach and the precision of the results obtained by its application, the multivariate approach is superior to the univariate technique when studying personality. Furthermore, the global personality of individuals is multivariate rather than univariate in nature. The findings from the univariate and the multivariate results tend to suggest that the physical fitness program helps in stabilizing the factors affecting personality.

R. John Young
Physical Education for Men
Purdue University
Lafayette, Indiana 47907

March 27, 1972

11:30 a.m.

MOTOR SKILLS PERFORMANCE OF SIXTH GRADERS AND THEIR PARENTS.

Paul Dunham, Jr., University of North Carolina.

The purpose of this study was to investigate the relationship between the performance of sixth grade students and their natural parents on five novel motor skills. Twenty sixth grade students and their natural parents volunteered to serve as subjects for this study. Subjects practiced the following tasks: pursuit rotor with the preferred hand, pursuit rotor with the non-preferred hand, speed tapping, mirror peg turning, and synchronized tapping. Hypotheses tested included: (1) that there would be a significant difference between the performance of children and their parents with the latter being superior; (2) that all groups would exhibit substantial improvement during testing; (3) that the performance of children and their parents would be highly correlated; (4) and that children would perform more like their parents of the same sex than the parents of the opposite sex. The analysis of the data included computation of correlations between various groups, analysis of variance for initial and final performance, and correlated t tests for determining performance improvement. Results indicated that in general parent's performance was significantly superior to their child and that all groups exhibited improvement through practice. However, results failed to provide support for the remaining hypotheses. Performance of children and their parents were for the most part near zero, there was no significant difference between the relationship of children and their parent of the same sex and that of the other parent.

Paul Dunham, Jr.
Department of Physical Education
University of North Carolina
Chapel Hill, North Carolina 27514

March 27, 1972

11:45 a.m.

112

ACCURACY OF OVERHAND THROWING BEHAVIOR UNDER DIFFERENT ENVIRONMENTAL AND MOTIVATIONAL CONDITIONS. James E. Meyer and James E. Warren, Queens College.

Overhand throwing accuracy was observed under two variations of environmental control (closed and moderately open) and three variations of motivation (positive, none and negative). Each subject was given 25 dart throwing trials at an obscured target. Feedback was administered after each trial by use of a light board that duplicated the dimensions of the circular styrofoam target. The subjects receiving positive or negative motivation were administered a set verbal phrase after every block of 5 trials. A 2x3x5 factorial design with repeated measures on the last factor (blocks of trials) was used, with a random blocks procedure for assigning the 36 male undergraduate students to the six treatment conditions. Accuracy was measured by the distance the dart landed from the center of the target. The score derived was the mean of the five accuracy measures in a block of five trials. Significant results were found for the main effects of blocks of trials ($p \leq .01$) and for the interaction between motivation and blocks or trials ($p \leq .05$).

James E. Meyer
Queens College
Flushing, N.Y. 11365

March 27, 1972

3:00 p.m.

EFFECTS OF INITIAL AND INTERPOLATED FATIGUE ON LEARNING AND PERFORMANCE OF A GROSS MOTOR SKILL. Doyice Cotten, William Spieth, Jerry Thomas, and Judson Biasiotto; Georgia Southern College.

The purpose of this investigation was to determine the effects of interpolated specific and total body physical fatigue upon the performance and learning of a gross motor skill. Seventy-five male Ss were randomly assigned to one of 3 groups: Group A (specific body fatigue), Group B (total body fatigue), and Group C (control). The gross motor learning task was a modification of the Mirror Target Toss Test (McGraw, R Q 22: 191-200). Each S was given one initial trial (5 throws). This was followed by the appropriate experimental condition: Group A - 7 min. of severe overall physical activity (stool stepping--60 complete step-ups per min.), Group B - 5 min. of severe specific exercise (reverse curling 23 lb. Easy Curl Bar--30 rep. per min.), and Group C - 5 min. of rest. Each S was then given 10 consecutive trials (50 throws) with the assigned physical fatigue interposed for 30 sec. following each 2 trials. On the subsequent day, the Ss were given 3 consecutive trials (no exercise condition on 2nd day). The learning score was calculated by the percent of possible improvement method: $$\text{Learning} = \frac{\text{Final Score - Initial Score}}{\text{Maximum Possible Score - Initial Score}}$$ The score of the 1st trial served as the initial score while the $\bar{X}$ of the 3 trials for the 2nd day served as the final score. The reliabilities for the learning task for each group were $r_{\alpha} = .89$, $r_{\beta} = .83$, $r_{c} = .90$. The learning scores for each group were analyzed by simple ANOVA with the results indicating that fatigue had no significant effects ($F = 0.97$) upon the amount learned. The effects of either total body or specific fatigue upon the performance curves (10 trials after the imposed condition with the conditions interposed between every 2 trials) were analyzed by Discriminant Analysis. Results indicated that the curve of the group resting before and between trials was significantly different (Mahalanobis $D^2 = 68.79$, $df = 20$, $p < .01$) from the curves of the other two groups. The results of this study indicated that while performance was impaired by both specific and total body fatigue, the amount learned was unaffected by fatigue.

Jerry R. Thomas
Georgia Southern College
Statesboro, Georgia 30458

March 27, 1972
3:15 p.m.

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GROSS MOTOR LEARNING: THE EFFECT OF INDIVIDUALS GROUPED HOMOGENEOUSLY, HETEROGENEOUSLY, AND ALONE ACCORDING TO ABILITY. Mary V. Livingston, State University College at Brockport.

The motivational effect on learning a motor skill when performing alone, in coacting-homogeneous, or in coacting-heterogeneous groups of low, moderate, and high ability was investigated for high school women. A pre-test of 20 trials on the Bachman ladder-climb was administered to two hundred volunteers in order to group them according to ability on a subsequent 60-trial post-test. Eighty-one subjects were randomly assigned to the groups. The design of this study consisted of a 3 X 3 X 6 factorial design with repeated measures on the last block-of-trials factor. The first fixed factor was the type of grouping (heterogeneous, homogeneous, and alone) and the second fixed factor was ability level (low, moderate, and high). Analysis of the pre-test data indicated that both the ability and grouping factors were significant at the .05 level. A one-way analysis of covariance for each of the nine grouping-ability combinations was computed on the post-test means which were summed over all 60-trials and adjusted according to initial differences on the 20-trial pre-test. Results of this analysis were significant. The post-test results showed that the coacting-homogeneous moderate group performed significantly better than the coacting-heterogeneous moderate group. All other significant differences were the result of deliberate grouping of subjects according to ability rather than by grouping subjects into coacting-heterogeneous, coacting-homogeneous, and non-coacting individuals.

Mary V. Livingston
Dept. of Physical Education
State University of New York
Brockport, New York, 14420

March 27, 1972

3:30 p.m.

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THE EFFECTS OF GROSS MOTOR SKILL OVERLEARNING ON RETENTION BY MENTALLY RETARDED MALES. William C. Chasey, University of Texas at Austin, Claudia Jane Knowles, University of Texas at Austin.

The purpose of this investigation was to study the effects of gross motor skill overlearning on retention by mild, moderate and severe institutionalized male retardates. It was hypothesized that mentally retarded males who overlearned a motor skill task would be superior in retention after 5 weeks of no practice to a control group of male retardates who learned but did not overlearn the task, and that overlearning would be a greater factor in retention for the severely retarded males than for the mildly retarded males. Seventy nine mentally retarded males were randomly assigned to one of two groups: 1) experimental overlearning group, 2) control learning group. The criterion measure of motor learning involved the accurate throwing of a bean bag at a wooden target from an 8 and then a 16 foot distance. Learning of the motor task at 8 feet occurred when the subject received 10 points in 3 consecutive throws. Learning at 16 feet occurred when the subject received 6 points for 3 consecutive throws. Group 1 (learning) stopped when the learning criterion for each distance was accomplished one time. Group II (overlearning) continued to throw beyond the learning distances until they were able to complete the task at both distances 3 consecutive times. Both groups were posttested for retention after 5 weeks of no practice. The study revealed that the overlearning group was superior in retention to the learning group after 5 weeks of no practice and that overlearning was most effective for the more severely retarded.

William C. Chasey, Ph.D.
University of Texas at Austin
Austin, Texas 78712

March 27, 1972

3:45 p.m.

COINCIDENCE-ANTICIPATION PERFORMANCE IN THE SAGITTAL AND FRONTAL PLANES. Harold L. Glad and Paul Dunham, Jr., University of North Carolina.

The purpose of this study was to determine whether there was a significant difference in coincidence-anticipation performance in the sagittal and frontal planes under conditions of various speeds. It was also the purpose of determine the relationship of a subject's ability to perform under varying conditions of speed and movement. Sixty undergraduate volunteer students enrolled at the University of North Carolina at Chapel Hill during the fall semester 1971 agreed to serve as subjects for this experiment. Subjects were given forty coincidence-anticipation trials, ten each under the following four different conditions: frontal fast, frontal slow, sagittal fast, and sagittal slow. The apparatus used in this experiment was a 12-foot long trough which a small car travelled through unobservable to subjects. Suspended from the bottom of the car was a 12-inch rod with a 2-3/4-inch styrofoam ball attached at the distal end. Subjects were required to turn a "Gaynor" switch off the instant the ball coincided with a metal flag. Actual time and subject's anticipation time were both recorded on Standard Electric timers, Model S-1 with subject's score being the difference between these two times. Results indicated that subject's performance for the various conditions correlated moderately for the various speeds (.64 and .68) to high (.78 and .83) for performances in the same plane. Analysis of variance: two way classification for subjects tested under different conditions for speed and plane of motion resulted in significant F's of 7.92 and 54.53, respectively. There was no significant difference between the performance of subjects initially practicing in the sagittal as opposed to starting practice in the frontal plane.

Harold L. Glad
Department of Physical Education
University of North Carolina
Chapel Hill, North Carolina 27514

March 27, 1972
4:00 p.m.

EFFECTS OF PRESENTING VARYING SPECIFICITY OF COURSE OBJECTIVES TO STUDENTS ON LEARNING MOTOR SKILLS AND ASSOCIATED COGNITIVE MATERIAL.[1] Herman Weinberg, University of South Florida.

This study was designed to determine if presentation of instructional objectives to students enhanced the learning of a skill and associated content material; and if so, what degree of specifity of objective is most effective. Four bowling classes were presented with either no objectives, general objectives, behaviorally stated objectives describing terminal (product) behaviors, or behaviorally stated objectives describing both intermediate (process) steps and terminal behaviors. After receiving pre-tests designed to measure bowling skill and knowledge of bowling technique, strategy, scoring and rules, the groups received ten weeks of instruction. The instructional materials and techniques were identical for all groups. The only variable was the depth to which the objectives they received delineated the behavioral outcomes of the learning experiences. At the completion of the ten-week period, the students were tested on the criterion measures. In addition, student attitudes concerning the value of receiving objectives were evaluated by means of a questionnaire. Preference for receiving objectives, a desire to receive objectives in all classes, and a positive feeling toward the guidance function of objectives were indicated by the responses to the questionnaire. The statistical analysis of the data representing bowling skill, knowledge, and form revealed no significant differences between the groups. A possible explanation of this outcome is suggested by the fact that the behavioral objectives were used as the guidelines for the design of all phases of the teaching-learning process. The structured nature of these activities would guide the students in all groups toward the achievement of the course objectives, negating any possible effects produced by the formal presentation of verying specifity of objectives to the respective groups.

[1]This study was completed as a doctoral dissertation at Temple University, May 1970.

Dr. Herman Weinberg
Dept. of Professional Phys. Educ.
University of South Florida
Tampa, Florida 33620

March 27, 1972

4:15 p.m.

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THE EFFECTS OF A PHYSICAL EDUCATION PROGRAM ON AUDITORY DISCRIMINATION ABILITY, VERBAL AND NON-VERBAL, OF KINDERGARTEN CHILDREN.
Mildred Evans, Southwest Missouri State College.

The primary purpose of this study was to investigate the effects of a planned physical education program on auditory discrimination ability, verbal and nonverbal, of young children at the kindergarten level. The Wepman Auditory Discrimination Test for verbal assessment, the TENVAD Test for assessment of nonverbal auditory discrimination, and the Metropolitan Readiness Test were administered to 66 children enrolled in three kindergarten classes in the Bolivar, Missouri public school system. Post-tests were administered six weeks later. Students were assigned at random to one of the treatment groups: Experimental Treatment Group I (physical education class designed to improve auditory discrimination ability), Experimental Treatment Group II (classroom procedures designed to improve auditory discrimination ability), and the Control Treatment Group (regular classroom procedures with recess). Covariance in a nested factorial design of the Metropolitan, Wepman, TENVAD, and TENVAD subtest titled Rhythm was used to investigate average change between the three groups and the effects of sex. Each of the Experimental Treatment Groups and the Control Treatment Group had an N of 22 (N=11 boys and N=11 girls). Significant differences found for the nonverbal auditory discrimination ability (TENVAD) were between the experimental classroom program designed for auditory discrimination training and the control classroom for treatment, sex, and interaction between sexes. The children in the controlled classroom appeared to show greater change in auditory discrimination ability, with girls showing greater change than boys (based on examination of the adjusted mean scores). Significant differences for sex were found among the Experimental Treatment Groups and the Control Treatment Group for Rhythm (TENVAD Subtest). The differences for boys appeared to indicate greater change from undergoing the experimental physical education program and least change in the controlled classroom. The girls' results showed no consistant pattern of change. The sequential program for kindergarten children in auditory discrimination ability designed for the classroom and for the physical education program was viable. The one factor affecting the viability of the program was motivation; i.e., the intensity of the program, in a six-week period did not allow the children opportunities to attend to and respond to other types of stimuli in their learning experiences.

Mildred B. Evans
Dept. of Physical Education
Southwest Missouri State College
Springfield, Missouri 65802

March 27, 1972
4:30 p.m.

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THE EFFECT OF IMMEDIATE VISUAL KNOWLEDGE OF RESULTS UPON THE LEARNING OF A SELECTED TRACK AND FIELD SKILL. Kirby E.A. Breithaupt John Abbott College, Montreal, Gary D. Sinclair, University of Montreal, Quebec.

The sample (N=78) consisted of the entire population (3 separate classes) of grade 7 boys who participated in the physical education program of a large regional (Beaconsfield, Quebec) high school. Each S was pre-tested for his ability to high jump utilizing the western roll technique and the maximum height attained using this form was recorded. The duration of this investigation was six class sessions, the entire time allocated for the development of high jumping skill.

The 3 groups were randomly designated as Control (conventional instruction), Experimental Group I (videotape - no replay), and Experimental Group 2 (videotape - with replay). EG2 received complete visual feedback of performance to complement the conventional verbal analysis and correction. EG1 was videotaped but visual feedback was withheld from the instructional process. All groups were taught by the same instructor who utilized standardized lesson plans throughout.

Daily performances were recorded and the data were treated through the analysis of covariance: (1) There were no significant differences found between the mean performances of EG2, EG1 or Control on either initial or final performances. (2) The mean performances of all groups increased markedly from sessions 2-3, following the first extensive analysis/correction period. For this practice period the Control recorded a mean gain of 2.47 inches whereas EG1 gained 3.0 inches and EG2 improved by 3.43 inches. These gains did not prove to be significant. (3) EG2 displayed the highest initial variability of all groups with a SD of 6.97 inches as compared to Control's SD of 5.88 inches and 3.53 for EG1. However, the final test revealed that EG2's variability decreased to a greater degree than the other group's. The final SD's decreased by 1.24 inches in EG2, by .96 inches in EG1 and by .08 inches in the Control group.

Although no significant differences were found between group performances, the videotape-with replay (EG2) group realized much quicker progress between weeks 2 and 6 than did the group taught in the conventional manner.

Gary D. Sinclair
Department of Physical Education
University of Montreal
Montreal, Quebec

March 27, 1972

4:45 p.m.

RHYTHMIC ACCOMPANIMENT AS A TEACHING AID IN THE DEVELOPMENT OF ELEMENTARY SPORTS SKILLS. Donald M. Megale, Oregon State University.

The purpose of this study was to determine the effectiveness of rhythm accompaniment as a teaching supplement to the conventional method of instruction in the development of selected sport skills at the fifth grade level. The population consisted of sixty-seven fifth grade pupils. Subjects were pre-tested to assess their performances in four selected sport skills: basketball dribble, overhand throw, instep soccer kick, and underhand volleyball serve. Three judges subjectively rated subjects' performances utilizing a check list of criteria. The subjects were then divided into a control group (thirty-three subjects) and an experimental group (thirty-four subjects) after being equated as closely as possible in skill activities. The same instructor taught both groups the four selected sport skills in two-week blocks comprising six class periods of forty minutes. The instructional period lasted eight weeks. The conventional method of instruction was used for both groups; however, the information variable, rhythm accompaniment, supplemented the conventional method of instruction for the experimental group. Two percussion instruments, tom-tom and piano, were used. After each instructional unit, all subjects were post-tested utilizing the same skill tests as used in the pre-test. The *t*-test and the paired *t*-test were used to accept or reject the general and sub-hypotheses. Critical ratio technique was used to analyze the data. The mean and standard deviation for both the control group and experimental group were calculated for the total score of the four skills and for each individual skill in both the pre-test and post-test. As a result of the study, the conventional method of instruction supplemented by rhythmic accompaniment was found to be superior to the conventional method of instruction without rhythmic accompaniment. The conventional method of instruction was also effective in teaching the four selected sport skills. The findings of the study were consistent with previous studies utilizing rhythmic accompaniment.

Donald M. Megale
Oregon State University
Corvallis, Oregon 97331

March 27, 1972

5:00 p.m.

THE EFFECTS OF THE INTEGRATION OF PHYSICAL EDUCATION WITH SELECTED SCIENCE CONCEPTS UPON SCIENCE KNOWLEDGE AND SELECTED PHYSICAL PERFORMANCE SKILLS OF BOYS AND GIRLS AT THE FOURTH-, FIFTH-, AND SIXTH-GRADE LEVELS. Peter H. Werner, Indiana University.

Initial tests were administered to 180 subjects on nine criterion variables. The variables were the softball throw for distance test, the soccer kick for distance test, the playground ball wall pass test, the McDonald Soccer Test, the standing long jump test, the wall rebound test, the shuttle run test, the work test, and the written science knowledge test. The subjects then took part in a learning program for a period of seven weeks which involved teaching four selected science concepts in the classroom and in physical education. The four science concepts selected for study were levers, Newton's First Law of Motion, Newton's Third Law of Motion, and work. The subjects were taught science in the classroom three days per week for 40 minutes each class period. The subjects were taught physical education two days per week for 40 minutes each class period. The control group received instruction in the selected science concepts from the classroom teachers. Physical education was taught without integration of the selected science concepts. The experimental group received instruction in the selected science concepts from the classroom teachers. The physical education teacher integrated the selected science concepts with the physical education instruction. Physical education teachers spent an equal amount of time on the integration of each science concept. They used every teachable moment to integrate science with physical education and maintained an activity oriented class rather than an academic class. At the conclusion of the period of seven weeks, all subjects were given a final test on the nine criterion variables. The experimental design was a four factor, nested design with a factorial arrangement of treatments. The data obtained from the final tests were analyzed by the analysis of covariance; the initial test data served as the covariate. A Tukey Test was used to examine significant differences at the grade levels and to test for significant differences between the initial and final tests for each of the experimental treatments utilized in the study. Separate analyses were performed for each of the nine dependent varialbes. Conclusions of the study indicated: (1) The experimental treatment was more effective as a method of increasing performance than the control treatment, and (2) Children in the sixth-grade and in selected instances in the fifth-grade performed significantly better than the children in the fourth-grade.

Peter H. Werner
Dept. of Women's Physical Education
Miami University, Oxford, Ohio

March 27, 1972

5:15 p.m.

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The effect of Augmented Vision and the Elimination of Obnoxious Irritants on Learning to Swim. John W. Merriman, Kansas State University.

One hu dred male freshman college students were divided into four experimental and one control groups to determine if increased vision and reduced anxiety produced faster learning rates among beginning swimmers. To increase vision and reduce anxiety goggles, nose clips and ear plugs were used. One experimental group used all three aids ar each of the other three experimental groups used a separate aid. The control group did not use any aids. Anxiety levels were determined through administration of six sub-tests of the Objective-Analytic Anxiety Battery from the Institute of Personality and Ability Testing. Learning rates were determined through skill evaluation by three expert judges. The subjects were tested after eight hours of instruction during which the experimental groups used their aids for all instructional periods. An additional eight hours of instruction concluded the experiment. During the second half of the experimental period subjects in the experimental groups were tapered away from use of the aids. At the end of the experimental period subjects stills were retested and anxiety levels reassessed. Data from the two testing sessions were compared by the analysis of variance statistical technique. Although increases in learning rates of the experimental groups were evidenced none were significant at the .10 level. It was concluded that some subjects' learning rates were enhanced enough to warrant further study in this area of investigation. This study was conducted in partial fulfillment of the requirements for the degree of Doctor of Education at the University of Northern Colorado under the direction of Dr. George H. Sage.

Dr. John W. Merriman
Physical Education Department
Kansas State University
Manhattan, Kansas 66502

March 27, 1972

5:30 p.m.

PHENOMENA OF THE SELF-EXPERIENCED BODY. Darlene A. Kelly, Towson State College.

This study was undertaken in order to examine and clarify the self-experienced body. There were two major portions of the study. The first was to analyze what Gabriel Marcel and Maurice Merleau-Ponty had, in selected literature, apprehended the self-experienced body to be. The second was to test the truth of those concepts derived from the author's analysis of herself experienced body in a movement situation. It was concluded that the phenomenal body is a structured whole of one's mental and substantial properties; a whole which is usually denoted by the word person. The function of the phenomenal body is: (1) as a nascent from giver, and hence, as an acquirer of knowledge, and (2) an expressive realization of intentional acts of consciousness and a communicator of acts of consciousness via observable, symbolic forms of willed movement.

Darlene A. Kelly
Towson State College
Towson, Maryland 21204

March 27, 1972
3:00 p.m.

PRECONDITIONS FOR SPORT: A PHENOMENOLOGY OF OPPOSITION. Robert Scott Kretchmar, State University of New York, College at Brockport.

The purpose of this analysis was to uncover several prerequisites for the intelligibility of opposition. The method used was Husserl's transcendental phenomenology which includes a starting point in lived experience, a suspension of judgement on the existence of objects experienced and a subsequent search for intuitively valid necessities for the consciousness of a given theme. It was discovered that oppositional intentionality requires that which is opposed. This necessary "otherness" is based equally, in principle, upon two possibilities--spatiality and temporality. The primordial here-there dichotomy grounds existential sport opportunities for opposing animate and inanimate others. The fundamental now-then bifrucation supports the sport dichotomies of man against historical and hypothetical performances. These two kinds of dichotomy rest, in turn, upon variability, for there could be no perception of "otherness" from the hypothetical single perspective on the world. Unilateral (man against a static other) and bilateral (man against a dynamic other) variation were subsequently identified as two equal possibilities for the intelligibility of dichotomy. Polarization which is oppositional, however, requires a common theme. Theme can be understood as a function of time and space as project meets "project" (the latter need not be a conscious-variable project) on the same intentional stratum. Finally, opposition rests upon a primordial hindrance, that something which disrupts, blocks or delays the completion of a given project. When no aspect of hindrance is recognized, activity may be characterized as "exercise." At the other extreme, absolute impossibility forces a dissolution of opposition.

Robert Scott Kretchmar
Department of Physical Education
SUNY-Brockport
Brockport, New York 14420

March 27, 1972

3:15 p.m.

A STUDY OF SELF-CONCEPTS OF COLLEGE STUDENTS. Namiko Ikeda, Slippery Rock State College

The purpose of this study was to investigate the self-concepts of physical education majors using the Self-Concept Test developed by Cratty and his associates. The sub-problem of this study was to find whether this testing instrument was effective in differentiating the high and low self-concept groups at the college age level. During the Spring and Summer semesters of 1970-71 school year, the test was administered to men (N=51) and women (N=47) physical education majors enrolled at Slippery Rock State College, Pa. They were upperclassmen between ages 19 and 22 years. They were asked to complete the questions by answering yes and no. Each was scored relative to the number of answers out of twenty which indicated a positive self-concept on the part of the subject. Scores were tabulated according to the sexes, and mean differences between the males and females as well as item-by-item comparison of percentages obtained by males and females were tested for significance by "t" test. Reliability was obtained by Kuder Richardson formula and was . 41. The result of the investigation indicated that the test was effective in differentiating between high and low-concept groups among physical education majors. There were significant differences between males and females on their total scores and those items relative to physical strength, appearance, social competency and emotional status at the 5 percent level.

Namiko Ikeda
Slippery Rock State College
Slippery Rock, Pennsylvania

March 27, 1972
3:30 p.m.

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AROUSAL LEVELS OF FEMALE TENNIS COMPETITORS DURING TOURNAMENT PARTICIPATION. Betty Hagerman, University of Texas at Austin.

Arousal levels of advanced female tennis players undergoing tournament competition were studied in terms of the variables of success/failure, match length, chronological age, and tournament experience. Changes in simple body reaction time were used as an indication of arousal, following the establishment of a practiced reaction time asymptote. The asymptote was the result of 8 blocks of 10 trials interspersed over two days in which there was no competition. Forty-nine subjects, who were high level competitive tennis players ranging in age from 10-18, were individually tested within 15 minutes prior to a tournament match and 15 minutes immediately following the match. Pre- and post-match testing each consisted of 4 blocks of 10 trials. Variables of success/failure and match length were analyzed factorially for each of three age groups and three levels of tournament experience. The factorial analysis was of A)subjects who won their matches with short match lengths (less than 1 hour), B)subjects who won with long match lengths, C)subjects who lost in short matches, and D)subjects who lost in long matches. Extremely high levels of arousal were obtained in the first block after competition, as evidenced by significant and dramatic decreases in the reaction times of all groups in all categories. In blocks 2, 3, and 4 following competition, arousal decreased markedly - in some cases to levels less than those in early practice trial blocks. Reaction time means were significantly faster with increasing age groups, but the age groups' performance over trials, other than magnitude, were not significantly different. The two between and one-within analysis indicated that neither success/failure nor match length appeared to produce differential levels of arousal prior to and after tournament match-competition. Experience groups were not significantly different in levels of arousal. Pre- and post-match within-subject variation was estimated by computing intraclass correlation coefficients over trials for each group category. Within-subject variation was similar in each of the groups, as the trial blocks temporally approached the competitive match. Group variation increased except in the 14 and under age group. Generally, advanced female tennis competitors became more and more aroused as a match approached. They individually were more consistent, and as age groups became more homogeneous. Following the match, individual consistency and group homogeneity decreased except in the youngest age group. Previous tournament experience, success/failure, and length of match did not appear to influence arousal levels.

Betty Hagerman
Dept. of Physical and Health Education, University of Texas at Austin, Austin, Texas 78712

March 27, 1972
3:45 p.m.

A STUDY OF THE RELATIONSHIP OF CREATIVITY AND TWO PERCEPTUAL TYPES, THE HAPTIC AND THE VISUAL, IN THREE SELECTED GROUPS OF COLLEGE STUDENTS IN THE RESPECTIVE DISCIPLINES OF DANCE, DRAMA, AND PHYSICAL EDUCATION. Marie M. McCluskey, Texas Woman's University.

Two tests thought to discriminate between haptic and visual perceptual types: the Quick Response Test and Visual Retention Test; and the Torrance Tests Of Creative Thinking Booklet B, figural form, including the factors of fluency, flexibility, originality, and elaboration were applied to seventy-eight university-level subjects in the respective disciplines of drama (N=29), physical education (N=25), and dance (N=24). No significant differences were found among three groups on the Quick Response Test, and the fluency, originality, and elaboration factors of the Torrance Tests Of Creative Thinking Booklet B. Significant differences were found among three groups on the Visual Retention Test $p.<.01$; and the flexibility factor of Torrance Tests Of Creative Thinking Booklet B $p.<.05$. It would appear that there is not a high relationship between perceptual type and creativity and, contrary to popular opinion, physical education students may be more creative than students from the areas of dance and drama.

Marie M. McCluskey
Kansas State Teachers College
Emporia, Kansas

March 27, 1972
4:00 p.m.

THE RELATIONSHIPS OF CREATIVITY, ATTITUDES TOWARD PHYSICAL EDUCATION, AND PHYSICAL EDUCATION ACTIVITY SKILL OF PHYSICAL EDUCATION STUDENTS AND THEIR TEACHERS. A. William Fleming, University of California, Santa Barbara.

The purpose of this investigation was to determine the relationships between a measure of creativity, a measure of attitude toward physical education and a measure of physical education activity skill of high school physical education students and their physical education teachers. Hypotheses stated that the following concepts are positively related: teacher creativity, student creativity, student attitude toward physical education, and student physical education activity skill. Eleven physical education teachers and 223 of their physical education students were selected as subjects from two high schools in Wauwatosa, Wisconsin. The sources of data used were the results of the Alpha Biographical Inventory, the Kneer Attitude Inventory and the physical education activity skill scores assigned each student by his or her physical education teacher. The Alpha Biographical Inventory provided a creativity score for the teacher and student subjects and the Kneer Attitude Inventory measured the attitudes of the student subjects toward physical education. The physical education activity skill score represented the mean skill ability of each student in all physical education activities. Kendall's tau for rank order correlation was used for final analysis of the data. This investigation resulted in the following conclusions: 1) there was no significant relationship between teacher creativity and student creativity, 2) creativity of the physical education teacher and student attitudes toward physical education were positively related, 3) there was no significant relationship between student creativity and student physical education activity skill, 4) student attitudes toward physical education and student physical education activity skill were negatively related, and 5) there was no significant relationship between student creativity and student attitude toward physical education.

A. William Fleming
Dept. of Physical Education
Univ. of California, Santa Barbara

March 27, 1972
4:15 p.m.

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A STUDY OF THE STABILITY FOR TWO EXTREME PERCEPTUAL TYPES, THE VISUAL AND THE HAPTIC, IN RELATION TO LEARNING DANCE MOVEMENTS.
Dr. E. Ruth Green, Texas Woman's University.

This study attempted to determine if two extreme perceptual types, the visual and the haptic, remain stable when learning dance movements taught with distinct methods emphasizing similar and different perceptual modalities.

Sixty-one undergraduate students enrolled in physical education activity classes at Georgia Southern College in Statesboro, Georgia, were used as subjects. A battery of three tests selected from the literature and modified for the investigation was used to measure perceptual discrimination.

Subjects were tested, evaluated, designated as a distinct perceptual type and volunteered to participate in the study. Three distinct teaching methods, the visual, the visual-haptic, and the haptic were used. Subjects were retested and re-evaluated at the conclusion of the experimental teaching period. The treatment of the data was by analysis of variance.

It was concluded that extreme perceptual types remain stable although exposed to distinctly different teaching methods.

E. Ruth Green, Ph.D.
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March 27, 1972
4:30 p.m.

A BIOGRAPHY OF WALTER TERRY WITH EMPHASIS UPON HIS PROFESSIONAL CAREER AND HIS CONTRIBUTIONS TO THE FIELD OF DANCE. Lois E. Andreasen, University of North Carolina at Greensboro.

Walter Terry served as a dance critic on the Boston Herald newspaper staff from 1936 until 1939, at which time he became employed as dance critic for the New York Herald Tribune until that newspaper terminated in 1966. In 1966, Terry joined the staff of the Saturday Review as the first dance critic to write for a major American magazine. Terry contributed to the development of dance not only as a dance critic, but also as a lecturer at numerous colleges, universities, high schools, and private organizations. He has also produced a weekly radio program and has been an active participant in many television productions over national networks. Of equal importance with Terry's contributions to the field of dance in terms of his criticisms, personal appearances, and lecturers are the numerous books which he has written and materials for foreign countries. According to Terry, the critic's main purpose in the over-all culture is the unceasing attempt to raise and/or establish the standards of art in America at a high level. In giving advice to potential dance critics, he emphasized the need for critics, the different media in which criticism can be used, the necessity of studying all possible aspects of dance, and the realization of the dance critic's function as an integral part of the art. In recognition of his work and dedication to dance, Terry has been awarded various honors in recognition of his inestimable contributions to the field of dance.

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March 27, 1972

4:45 p.m.

AN HISTORICAL STUDY OF SELECTED POPULAR BELIEFS AND PRACTICES PERTAINING TO PREGNANCY AND CHILDBIRTH IN THE STATE OF TEXAS FROM 1845 THROUGH 1968. Barbara A. Sears, Texas Woman's University.

The general purpose of the study was to prepare a written historical account of popular beliefs and practices pertaining to pregnancy and birth, with emphasis upon the care given to the childbearing woman, in the State of Texas from 1845 through 1968. The focus of the investigation was upon the nature of the care available to pregnant women at a given time and in a given place, and the particular agency acting in her behalf--whether individual, group, midwife, physician, magic, folk medicine, science, or modern medicine. The procedures followed in the development of the study included a documentary analysis of related literature, selection of methods of collecting and assimilating data from human sources, organization for the presentation of data, and preparation of the written report. All data were selected in accordance with the criteria established by the investigator--validity, reliability, objectivity, economy of time and money, and availability. The history of obstetrics in the State of Texas reveals that from the primitive beginnings of the Indians, obstetric progress has moved slowly from an era of ignorance and superstition to its present position-- a highly scientific medical specialty. Findings indicate that while care of the pregnant woman has improved considerably, progress has not been uniform among all peoples or in all localities. Findings indicate also that human attitudes and behavior appear to be the main deterrents to decreasing maternal and infant mortality.

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March 27, 1972

5:00 p.m.

THE RELATIONSHIP OF HEALTH KNOWLEDGES TO HEALTH PRACTICES OF COLLEGE FRESHMEN. Millard J. Fisher, DeKalb College.

The purpose of this study was to investigate the relationship of health knowledges to health practices of college freshmen.

Subjects for the investigation consisted of 101 male and 114 female college freshmen. A reliable health knowledge test and health practice inventory were administered to the subjects.

After the data were collected, the tenability of the hypotheses of the study were tested by the following statistical treatment:

1. The research hypotheses were restated in the null form.
2. The first nine hypotheses were tested by the utilization of the Pearson Product Moment Coefficient of Correlation.
3. Hypotheses ten and eleven were tested by the utilization of the significance of the difference between two means. Fisher's t test was used to ascertain the degree of confidence which could be put in the difference between the means.
4. The findings were arbitrarily rejected at the .05 level of significance.

The following conclusions were formulated from an analysis of the data obtained in this study:

1. The acquisition of health knowledge, as measured in this study, has little relationship to a student's health practices.
2. No significant relationship exists between health knowledge and application and reported health practices of male college students.
3. No significant relationship exists between health knowledge and application and reported health practices of female college students.
4. Female college freshmen possess health knowledge which is more favorable than that of male college freshmen.
5. Female college freshmen have more favorable health practices than do their male counterparts.
6. The presentation and acquisition of factual health knowledge does not assure favorable health practices.

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March 27, 1972
5:15 p.m.

HEALTH KNOWLEDGE OF YOUNG ADULTS FROM TWO SOCIO-ECONOMIC LEVELS. Donald E. Campbell and Roy A. Foster, Oregon State University

The purpose and experimental design of this investigation was directed to the question: Do students who attend a high school from an attendance district designated as a high socioeconomic area respond the same to a standardized health knowledge test as students who attend a high school from an attendance district designated as a low socio-economic area? The 1969 edition of the Kilander Health Knowledge Test was used as the criterion measurement instrument and was administered to all of the ninth and all of the twelfth grade students attending the two high schools. The criterion measure was the total response score on the criterion instrument. A triple classification 2 x 2 x 2 analysis of variance design was used to test the hypothesis that no significant difference would exist in the effects to be considered. A significant difference between criterion groups was obtained for effect A (socio-economic level), effect B (grade level), and effect C (sex) in addition to a significant A x B interaction effect. These results suggest the conclusion that high school students reflecting a high socioeconomic level have more knowledge and understanding of matters pertaining to nine categories of health than do similar students from the below average socioeconomic level. The magnitude of the difference between socio-economic levels diminished with the maturity of the students. Female respondents attained a mean score higher than the male and the scores by sex were independent of either grade level or socioeconomic status. On the basis of a multivariate discriminate analysis, response scores on three categories of health knowledge, Family Living, Safety Education, and Mental Health, were the primary contributors to the separation of the groups.

Donald E. Campbell
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March 27, 1972
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